Founded in 1832

RAILWAY LOCOMOTIVES AND CARS

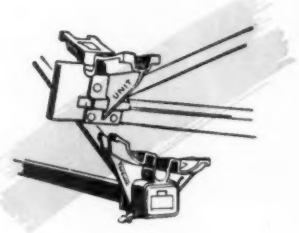
OCTOBER 1954

One of Five Specialized Railway Age Publications

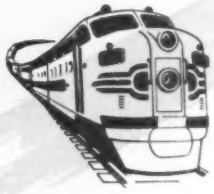
formerly Railway Mechanical and Electrical Engineer

"Buffalo Factory-Rebuilt Brake Beams Make Money For This Railroad . . . ."

Here's how—

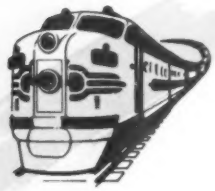


At all points where scrapped brake beams accumulate we reserve a special pile of *Buffalo Unit* and *Buffalo Truslock* Brake Beams.



At suitable intervals we ship these worn or damaged beams to the manufacturer's central reclamation plant at Buffalo, N. Y.

Buffalo rebuilds our brake beams on the same machines, and by the same methods, as those used in the fabrication of new brake beams.



Buffalo ships our rebuilt and tested brake beams back to us—fast!

Buffalo factory-rebuilt brake beams are on a fixed price basis, assuring us a handsome saving on every factory-rebuilt No. 18 brake beam we apply to foreign cars.

Your Buffalo-Unit field representative will be glad to discuss this low cost reclamation service with you at any time.

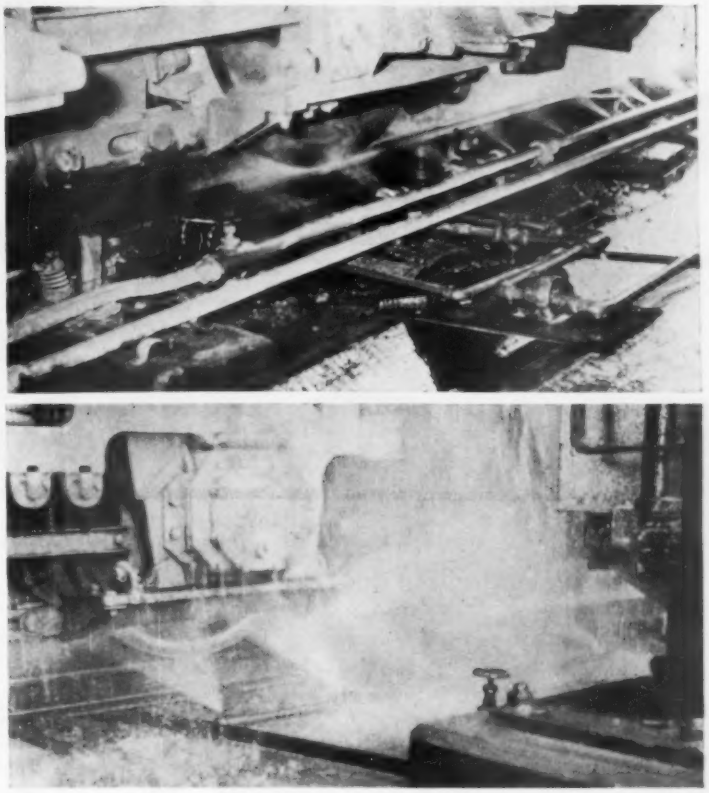
Buffalo Brake Beam Company

Brake Beams *Exclusively* For 50 Years

New York **Buffalo** **Hamilton, Ont.**

Save Money

Clean diesel wheels and trucks with automatic Oakite "track-trip" spray-washing



Oakite automatic "track-trip" wheel cleaning set-up saves money. It prevents solution and rinse water waste. Top picture, cleaning. Bottom picture, rinsing.

YOU ARE LOOKING at a set-up for cleaning and rinsing diesel wheels and trucks. It was designed by Oakite for a big Western Railroad. These pictures were taken at that yard.

THIS ROAD wanted to eliminate costly, time-consuming manual cleaning. They were looking for some simple, inexpensive mechanical method . . . one they could build themselves in their own yard.

HERE'S HOW IT WORKS. Pressure, transferred from wheel flange to track tripper, depresses valves for spray cleaning. Solution spray responds only to wheel pressure. Spraying stops as wheel pressure diminishes.

RESULTS. Considerable savings in solution upkeep and less waste of rinsing water since spraying occurs only as wheels enter spraying area. No time wasted for manual valve adjustments. No hand scrubbing.

If you'd like more information on washing diesel wheels and trucks just drop us a line. We'll be glad to send you complete details, drawings.

Oakite Products Inc., 46 Rector Street, New York 6, New York

OAKITE

RAILWAY DIVISION

AIR COSTS MONEY!

Stop leakage with new WABCOSEAL® Angle Cocks

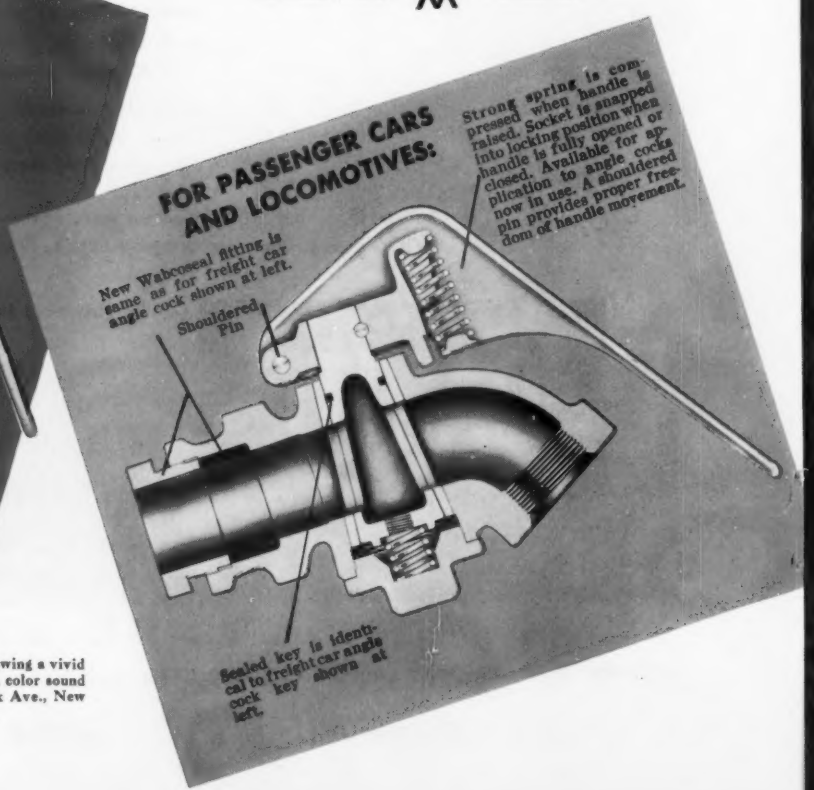
BRAKE pipe leakage increases compressor operation, lowers its efficiency and causes difficult train handling. Reduce leakage to the minimum by installing the *new* Wabcoseal Angle Cock shown here. Two styles are available—with or without spring-locking handle.

Heart of the new Wabcoseal Angle Cocks is the sealed key that stays tight through a wide degree of key wear. A Wabco compression ring replaces the standard tapped thread at the brake pipe end to give a positive seal. Also, adequate end tolerance is provided so brake pipe nipple need not be cut to precise length.

The passenger car and locomotive angle cock has a spring loaded handle that snaps the socket into locked position when handle is fully open or closed and keeps it there despite vibration and shock.

The sealed key and spring locking handle are available separately for application to present angle cocks.

Westinghouse Air Brake
COMPANY
AIR BRAKE DIVISION WILMERDING, PA.



NEW MOVIE AVAILABLE entitled, *"AT THIS MOMENT"*—showing a vivid story of modern railroad progress. Length 26 minutes, on 16 mm. color sound film. For use of film write: United World Films, Inc., 1445 Park Ave., New York or Association Films, Inc., 347 Madison Ave., New York.

October, 1954
VOLUME 128
No. 10

RAILWAY LOCOMOTIVES AND CARS

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C. B. Peck

H. C. Wilcox

Wilcox Succeeds Peck as Editor

The Retiring Editor

"Free to tackle a number of special editorials and studies—broad gauged in character—in the mechanical field . . ." is the new assignment for Clair Beach Peck, effective October 1, following completion of this issue, after 40 years of service with Simmons-Boardman. Editor of *Railway Locomotives and Cars* since 1948 and, before that, managing editor starting in 1923, Peck now becomes consulting editor, at liberty to roam and ruminate as a member of the editorial staff, with the time, according to Publisher J. G. Lyne, "to undertake analytical articles and editorials."

It is ironic that, after waiting many years for an appropriate opportunity to say what has long been felt about the Boss, a severe space limitation is imposed. This kind of assignment would have appealed to Peck, of course; he is a master of tight writing and economy of words.

"C. B.," as he is known to his friends, finished his technical education in 1907 when Michigan Agricultural College (now Michigan State) conferred upon him the degree of B.S. in M.E. Shortly thereafter he entered the service of the DSS&A, where his early contacts with motive power and rolling stock laid the foundation for an absorbing interest in the problems incident to design and maintenance of cars and locomotives. There followed three years on the mechanical engineer's staff of the Santa Fe before he joined the staff of *Railway Age Gazette* and the then *Railway Mechanical Engineer*. It has been said

(Continued on page 139)

His Successor

Back in 1916, before most people knew whether a diesel was a sausage or a Prussian spy, a young mechanical draftsman on the Lackawanna got himself a job as a designer with an outfit in Connecticut making what were then termed "semi-diesel engines". After two years that same designer returned to the Lackawanna, but never forgot about diesels.

Harold Callender Wilcox, the new editor of *Railway Locomotives and Cars*, wields a sharp knife on cant, bunkum and flowery language. But even he will admit to feeling deeply about the conviction that it is foolish to buy a complicated new machine unless, at the same time, you take every care to give it the best in preventative maintenance.

A successful publisher, S. S. McClure, once said that "being interested is a large part of the editor's vocational equipment." Wilcox has that well-developed bump of curiosity. Born, significantly, in Honesdale, Pa., where the first real steam locomotive in America first turned a wheel, he learned to look into things by riding around the Pennsylvania countryside. Two businesses dominated the Scranton area where he later lived—coal mining and railroading. Wilcox tried the job of mine surveyor during vacations from college, while obtaining technical training at John B. Stetson University in Florida. He liked railroading better—especially backshop railroading, and in 1913 started with the Lackawanna as a shop draftsman. Following his two-year experience in the diesel

(Continued on page 139)

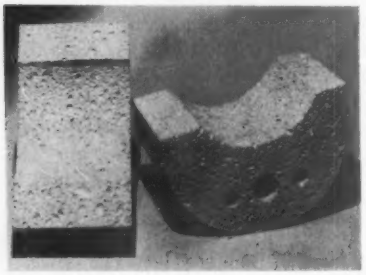
NEW DEVICES

Cellulose Journal Packing Pads

One of the latest developments in the campaign to reduce hot boxes and to improve methods of lubricating car wheel journals is the Cel-O-Pak* cellulose sponge journal packing pad, a non-mechanical device designed to obtain the following advantages:

1. Assure positive and ample journal lubrication.
2. Maintain constant journal contact.
3. Prevent freezing to the journal or becoming displaced during low-temperature operations.
4. Furnish required year-round performance over full ambient temperature range.
5. Eliminate underpacked or overpacked boxes by being "pre-machined" to fit all AAR journal boxes.
6. Maintain the required physical dimensions indefinitely, thereby reducing maintenance and servicing expense.
7. Allow simplified inspection with no need for a spudding iron.
8. Permit a visible positive oil level, thus to prevent over-oiling with subsequent oil throw-out at the back of the box.
9. Easy and quick installation without the use of packing irons.
10. Operate efficiently for a minimum of 24 months and possibly for 36 months.
11. Require no servicing except to maintain oil level.
12. Reduce box temperatures by "just right" lubrication without grabbing or glazing.

* The term "Cel-O-Pak" is a registered trademark of the O-Cel-O Division of General Mills, Inc.

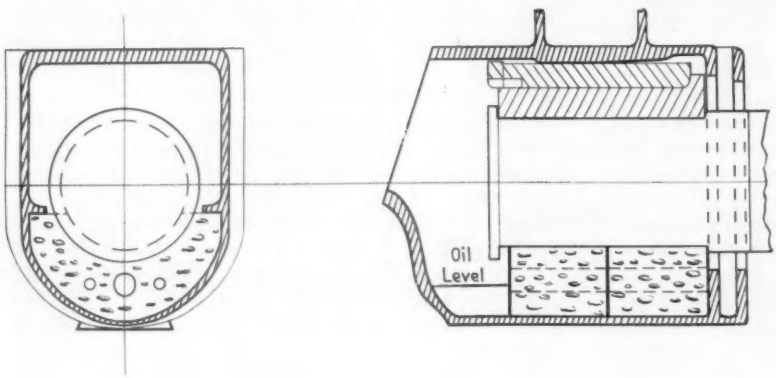


Actual road tests have been under way for the past two years. Cel-O-Pak cellulose journal packing pads were placed on over 100 cars of various types—passenger, baggage, rack, flats, ballast, tenders, slag gondolas, hoppers and cabooses, as well as three diesel locomotives in both the United States and Canada. To date a maximum of 22 months operation has been logged on some cars, with a maximum annual mileage of approximately 50,000 on one car. Other cars vary from about 35,000 miles over a 22-month period to 12,000 miles over a three-month period. The Cel-O-Paks have operated at varying train speeds through a temperature range of 95 deg F to minus 40 deg F. The ultimate service life has yet to be determined; frequent inspections indicate that they will run for many more months.

No instances of abnormal temperatures have been recorded, and when journal temperatures were checked with a pyrometer and compared with waste packed boxes, the Cel-O-Pak boxes were consistently lower by as much as 25 deg F. Neither has there been a single instance of the sponge packing pad freezing to the journal during low temperature operations and an ample supply of lubrication has been evident at all times, summer or winter.

The potential operating economies of the new packing unit are indicated by the illustrations. Mounted two to each journal, they can be installed in about two minutes, without the necessity of carrying buckets of waste, gallons of oil and cumbersome packing irons. The number of Cel-O-Paks needed to service one car are packed in a small carton weighing but 12 lb. The pads are saturated by immersing in lubricating oil right on the job and are installed in the box by hand. Sufficient oil is then added to give the desired 1-in. *visible* level and the journal is ready for service. The packing does not have to be set up with an iron at every stop, and oil added, with the final equation based on human judgment, varied opinions, or "feel" of the condition.

A set of the "pre-machined" cellulose pads (left) which can be installed by hand, and (below) the sections of the complete box.



Although the manufacturer has preferred and used actual service tests, laboratory tests have been run coincident with them, since certain conditions could not be established on the road in the way of accelerated destructive testing. For example, speeds up to 100 mph, under a constant ambient temperature of 130 deg F over an 8-hour period were established in the laboratory. During this test the temperature of the Cel-O-Pak pad became stabilized at a maximum journal temperature of 242 deg F.

The table shows journal running temperatures on four cars on one road during winter operations, with a comparison between waste packed boxes and Cel-O-Paks.

Cel-O-Pak Boxes Deg F	Waste Packed Boxes Deg F	Ambient Temperatures Deg F
75 to 130	120 to 155	—6
110 to 145	130 to 150	20 to 30
90 to 115	150 to 155	—2
95 to 110	150 to 155	—10

Additional information relating to performance at temperatures as low as 35 deg F below zero is available.

An interesting fact is the ability of Cel-O-Pak to maintain clean boxes which could eliminate the troublesome and costly waste grab.

Laboratory tests are now being continued together with road tests sanctioned under limited AAR approval for use on interchange cars. The aim is to extend the present repack period to 36 months in order to coincide with the current air-brake servicing period and to further reduce maintenance costs and out-of-service time per car.

Cold Degreasing Solvent

Large-scale production of a nonflammable solvent for use in the metal and metal-working industries has been announced. The product is Chlorothene (inhibited 1,1,1-Trichloroethane).

According to the manufacturer, the formulation fulfills the need for a low toxicity, nonflammable solvent for use in cold cleaning and cold degreasing operations. It is also suited for other applications reserved for the more toxic or more flammable solvents.

Chlorothene virtually eliminates corrosion of aluminum and aluminum alloys except under drastic conditions. *Dow Chemical Company, Midland, Mich.*

(New Devices continued on page 130)

NEWS . . .

Dale W Shackley (left), superintendent of communications, and James J. Wright, manager of equipment, P&LE, checking their invention, the "Dial-a-Diesel" system.

"Dial a Diesel"

By means of existing telephone lines and a system of relays, diesel locomotive engines can be equipped to start by telephone anywhere on the Pittsburgh & Lake Erie when connected to a plug-in station, according to an announcement released by the New York Central System, of which the P&LE is an affiliate. The invention, the announcement says, provides a practical, economic solution for the protection of diesel engines out of service at remote points. It gives a man at a central control point constant supervision over all engines using the device, thus preventing freezing, overheating, and unauthorized movements, and detecting vandalism. In tests, P&LE diesels have been started from as far off as New York, although distance is said to mean nothing in the operation of this electrical supervisory system for switching locomotives, or D-A-D for "Dial a Diesel" as it has been nicknamed. The system, according to the release, operates as follows.

Beside each track where engines are to be left when out of service, there is a relay box or plug-in station. From the station a cable is run to a receptacle on each locomotive. Each engine's electrical circuit is so arranged that relays from the plug-in station enable it to close its own starting contact. A temperature relay system indicates when water temperature reaches a pre-set low or high (50 deg and 150 deg, respectively, in the P&LE case). At either temperature the system causes a bell (or buzzer) on the locomotive to sound. This sound is transmitted to the central control station in McKees Rocks, Pa., by a telephone mouthpiece on the engine.

At the control station, a bell rings and a light flashes, indicating that an engine needs attention. The control-room operator then operates the various engine codes to locate the engine. He first hears the fuel pump start and then the engine crank, if the alarm comes from a cold engine. Another code operates to shut off an overheated engine. The engine, if not running right, can also be shut off at any water temperature.

Another control enables the operator to shut an engine off so it cannot be started from the control center. If anyone disconnects the plug at an engine receptacle, that fact is automatically signaled to the control center so necessary protective steps can be taken at once.

Where a selective code system is not available, the control-center operator will contact the switchboard operator, asking the operator to send the various codes for whatever he may wish to do. On one telephone circuit 241 diesel units can be controlled.

The system is the invention of Dale W. Shackley, superintendent of communications, and James J. Wright, manager of equipment, P&LE.

SUMMARY OF MONTHLY HOT BOX REPORTS

	Foreign and system freight car mileage (total)	Cars set off between division terminals account hot boxes			Miles per hot box car set off between division terminals
		System	Foreign	Total	
June, 1951	2,874,873,495	7,074	15,376	22,450	128,057
July, 1951	2,768,920,095	8,886	18,823	27,709	99,929
August, 1951	3,009,371,111	9,023	19,092	28,115	107,038
September, 1951	2,925,570,545	6,472	13,565	20,037	146,008
October, 1951	3,116,490,095	4,131	9,053	13,184	236,384
November, 1951	2,939,503,144	2,022	4,405	6,427	457,368
December, 1951	2,752,316,133	2,130	5,398	7,528	365,611
January, 1952	2,824,298,630	3,208	7,197	10,405	271,437
February, 1952	2,809,162,671	2,723	6,473	9,196	305,477
March, 1952	2,943,812,727	2,594	5,877	8,471	347,517
April, 1952	2,766,313,714	3,826	7,759	11,585	238,784
May, 1952	2,918,508,445	6,020	10,938	16,958	172,102
June, 1952	2,672,512,889	8,466	14,495	22,961	116,394
July, 1952	2,575,298,912	10,566	15,833	26,399	97,553
August, 1952	2,924,917,122	11,658	17,535	29,193	100,192
September, 1952	2,931,129,734	7,536	13,608	21,144	138,627
October, 1952	3,093,990,289	4,058	8,053	12,111	255,469
November, 1952	2,984,101,808	2,198	4,501	6,699	445,455
December, 1952	2,869,928,617	1,742	3,632	5,374	534,040
January, 1953	2,828,906,282	2,219	4,123	6,342	446,059
February, 1953	2,625,563,462	2,111	4,059	6,170	425,537
March, 1953	2,904,227,804	2,696	6,077	8,769	331,192
April, 1953	2,850,752,648	3,383	6,435	9,818	290,359
May, 1953	3,013,610,843	5,892	11,433	17,325	173,945
June, 1953	2,926,001,360	8,537	15,296	23,833	122,771
July, 1953	2,925,317,024	9,342	15,775	25,117	116,467
August, 1953	2,971,020,484	8,638	14,160	22,798	130,319
September, 1953	2,822,222,832	6,083	10,195	16,278	173,376
October, 1953	3,042,558,922	3,863	6,493	10,356	293,796
November, 1953	2,788,773,285	1,987	3,404	5,391	517,301
December, 1953	2,656,063,018	1,581	2,550	4,131	642,958
January, 1954	2,583,485,918	3,082	3,797	6,879	375,561
February, 1954	2,445,214,845	2,953	4,066	7,019	348,370
March, 1954	2,658,757,249	2,196	3,637	5,833	455,813
April, 1954	2,570,518,990	3,079	5,149	8,228	312,411
May, 1954	2,713,511,223	4,416	6,510	10,926	248,353
June, 1954	2,662,375,708	6,597	9,617	16,214	164,202

Journal Repacking On 36-Month Basis

The Mechanical Division of the Association of American Railroads has issued a detailed list of journal box repacking dates for 50 Pennsylvania 70-ton hopper cars equipped with Plypak waste containers, and authorized extension of the repacking period to 36 months for the purposes of the test.

These cars were equipped with Plypak containers between July 1951 and January

1952; the new repacking dates range from July 1954 to January 1955.

As these cars are repacked it is requested that M. A. Pinney, engineer of tests, Pennsylvania, be notified of the car number, condition of the containers, packing, journal bearings and lubrication.

Elmer R. Kaiser Named ASHVE Research Director

Elmer R. Kaiser has been appointed director of research for the American Society of Heating and Ventilating Engineers, with headquarters at the ASHVE Research Laboratory, Cleveland 3.

Delays Inspection Rules For Self-Propelled Cars

The Interstate Commerce Commission has set back until January 1, 1955, the effective date of the rules it has prescribed for the inspection of multiple-unit equipment, i.e., electrically-propelled cars operated by a single set of controls. The rules had been scheduled to become effective September 1.

ASME-ASLE Lubrication Conference

The first lubrication conference sponsored jointly by the American Society of Mechanical Engineers and the American Society of Lubricating Engineers will be held at the Lord Baltimore Hotel, Baltimore, October 18-19. The most recent developments in lubrication over the past year will be discussed at this conference which is expected to offer advantages far greater than those offered by individual conferences of the ASME Lubrication Activity and the ASLE, which have one specific field in common.

Approximately 18 papers will be presented. Two sessions will be held each day, with an evening session on October 18.

ORDERS AND INQUIRIES FOR NEW EQUIPMENT PLACED SINCE THE CLOSING OF THE SEPTEMBER ISSUE

DIESEL-ELECTRIC LOCOMOTIVE ORDERS

Road	No. of units	Horsepower	Service	Builder
Union Pacific	50[1]	1,750	Freight	Electro-Motive
Canadian National	13 "A"[2]	1,750	Passenger	General Motors Diesel, Ltd.
	13 "B"[2]	1,750	Passenger	General Motors Diesel, Ltd.
	27[2]	1,750	Road switch	General Motors Diesel, Ltd.
	6 "A"[2]	1,600	Passenger	
	6 "B"[2]	1,600	Passenger	Canadian Locomotive
	18[2]	1,600	Road switch	Canadian Locomotive
	23[2]	1,600	Road switch	Montreal Locomotive
Grand Trunk Western	15[2]	1,750	Road switch (frt.)	Electro-Motive
	2[2]	1,750	Road switch (pass.)	Electro-Motive
Central Vermont	2[2]	1,600	Road switch (frt.)	American Locomotive
	2[2]	1,600	Road switch (pass.)	American Locomotive

FREIGHT-CAR ORDERS

Road	No. of cars	Type of car	Builder
Bangor & Aroostook	350[3]	50-ton refrigerator	Pacific Car & Fdry.
Columbia Geneva Steel Co.	9	90-ton gondola	Thrall Car Mfg.
New York, Chicago & St. Louis	150[4]	Box	Greenville Steel Car
Detroit & Toledo Shore Co.	100[4]	Box	Greenville Steel Car
New York, New Haven & Hartford	85[5]	Covered hopper	Pullman-Standard
North American Car Corp.	10	70-ton phosphate	Thrall Car Mfg.
Southern Pacific	1,500[6]	Box	Company shops
Texas Natural Transportation Co.	150[7]	Special tank	General American
Union Pacific	200[8]	70-ton tank	ACF Industries
	300[8]	50-ton automobile	Pullman-Standard
	200[8]	50-ton box	Pullman-Standard

PASSENGER CAR ORDERS

Road	No. of cars	Type of car	Builder
Long Island	2[9]	Rail diesel	Budd Co.
	125	Coaches	Pullman-Standard
Louisville & Nashville	13[10]	60-passenger coach	ACF Industries

[1] Deliveries to be completed by May, 1955.
[2] Cost, $8,680,000. Delivery to have been completed in September.
[3] Estimated cost, $3,500,000. To be delivered in March and April, 1955. Production expected to start in two or three months.
[4] Cost, approximately $8,000 each.
[5] Most of the cars will have 15-ft. doors to permit easier loading and unloading of lumber.
[6] For distribution of LP gas. To be financed in part by Mutual Life Insurance Co. of New York.
[7] To be known as "CU DF" cars, combining cushion underframe construction with Evans "Damage Free" loading equipment and Nailable Steel flooring. The road's directors have authorized the purchase of 100 box cars at a cost of about $800,000.
[8] To be equipped with roller bearings. Delivery scheduled to begin late this year. Box cars to have cushion-type underframes and to be fitted along each interior side wall with five horizontal belt rails into which cross-bars can be inserted for bulkheading and compartmenting shipments.
[9] Cost, $17,000 each. For use on eastern part of Montauk branch.
[10] Cost, approximately $1.8 million. To be delivered late in second quarter of 1955.

NOTES:

Fruit Growers Express Company.—This company authorized construction during the first quarter of 1955 of 300 50-ton refrigerator cars.

Gulf, Mobile & Ohio.—The Gulf, Mobile & Ohio authorized by its directors to build 100 50-ton pulpwood cars. Date and place of construction have not yet been determined.

Missouri-Kansas-Texas.—The Missouri-Kansas-Texas is considering the purchase of 6 new coaches. Bids are under consideration for the construction of 500 box cars.

New York Central.—The New York Central has contracted with the General Electric Company to convert 20 electric locomotives, formerly used in the Cleveland Union Terminal on 3,000 volts dc, to 600-volt dc operation for service between Grand Central Terminal, New York, and Harmon, N. Y., and North White Plains. The work, which is to be done at GE's Locomotive and Car Equipment Plant at Erie, Pa., includes complete overhaul of all locomotives; installation of new electric propulsion and control equipment to make each of them capable of working at 4,670 hp on an hourly basis; mechanical reconditioning and repainting. The locomotives were released from service at Cleveland when that terminal was changed to diesel operation last year. The decision to convert them for New York service was based on performance and maintenance results of a similar Cleveland Union Terminal locomotive similarly converted in 1951.

Western Fruit Express Company.—Western Fruit has authorized construction during the first quarter of 1955 of 50 70-ton mechanical refrigerator cars.

AAR Has New Car Compression Test Machine

An aluminum dome car body was the first subject for the new one-million pound car compression test machine now installed in the AAR's research center at Chicago. The car, being built for the Union Pacific, was tested in the presence of officers of the road and of the builder—ACF Industries, Inc. The machine, one of two in the U. S., is now available to both carbuilders and railroads for compression testing of freight and passenger equipment.

PERSONAL MENTION

Central of New Jersey

ALBERT J. TRUSHEIM, assistant superintendent of floating equipment at Jersey City, appointed mechanical engineer, with headquarters at Elizabethport, N.J. Former position abolished.

New York Central

F. K. MITCHELL assigned to special staff duties with Karl. A. Borntrager, vice-president, operations and maintenance. Retains title of asst. vice-president-equipment, with headquarters at New York.

W. F. Kascal

W. F. KASCAL, mechanical superintendent of Texas & Pacific at Dallas, Tex., appointed chief mechanical officer of the NYC at New York. *Born*: Chicago, October 20, 1901. Education: I.C.S. courses in machine shop practices and roundhouse machinist. *Career*: Began with the Burlington November 23, 1922, serving successively as a machinist, roundhouse foreman, day foreman, general foreman, and acting master mechanic at various locations until April 23, 1943, when he became master mechanic on the Colorado & Southern at Denver. On June 1, 1947, he was appointed superintendent of motive power, of the C&S, and on August 1, 1949, went with the T&P as mechanical superintendent.

J. R. STEWART appointed assistant industrial engineer-equipment, with headquarters at New York.

Motorists: here's proof...

Gulf's cleaner-burning, super-refined gasoline solves today's No. 1 engine problem!

Laboratory tests promised...

. . . these *immediate* and *lasting* benefits from this new, super-refined fuel:

More complete engine protection than from the so-called "miracle-additive" gasolines. Why? Because Gulf refines *out* the "dirty-burning tail-end" of gasoline (the No. 1 troublemaker in high-compression engines)—and then treats this new Super-Refined NO-NOX to give it a *complete range of protective properties*. It protects *every* part it touches against carbon, rust, gum.

Extra gas mileage in all your everyday, short-trip, stop-and-go driving.

No knock, no pre-ignition. Why? Because the anti-knock power of new Gulf NO-NOX has been stepped up to an all-time high.

Stall-proof smoothness. Instant *starts*, too—and fast, fuel-saving warm-up.

That's why new Super-Refined Gulf NO-NOX gives your engine more power-with-protection than you've ever known.

Road tests proved...

These cars, powered by New Gulf No-Nox, actually performed better than new... after 15,000 miles!

True! After 15,000 miles per car—covering all conditions of city and country driving—Gulf test cars showed these results:

- Higher-than-new horsepower!
- Better-than-new on gasoline mileage!
- And not a single trace of carbon knock or pre-ignition at any time—even on the steepest mountain grades!

COMPLETELY NEW! SUPER-REFINED

New Gulf No-Nox

THE HIGH-EFFICIENCY GASOLINE

MICHIGAN CENTRAL DISTRICT

Equipment Department

H. W. RASOR, master mechanic—locomotive, at Chicago, given jurisdiction of the locomotive department of the West Division, including Niles, Mich.

W. E. ANDERSON, master mechanic—car, at Chicago, given jurisdiction of the car department of the West division, including Niles, Mich.

J. W. HESPEN, master mechanic-car, with headquarters at Detroit, given jurisdiction over all points west of the Detroit River to East Yard at Niles, Mich. Position of master mechanic-car at Jackson, Mich., abolished.

R. F. CULBRETH appointed master mechanic-locomotive, with jurisdiction over all points west of the Detroit River to East Yard at Niles, Mich. Headquarters, Detroit. Position of master mechanic-locomotive at Jackson, Mich., abolished.

H. R. WINGEART appointed district lubrication inspector at Detroit.

H. R. FRIEL appointed district supervisor electrical equipment, at Detroit.

J. J. NICOL, assistant master mechanic—locomotive and car, at Bay City, Mich., has had jurisdiction extended to include Lansing and Grand Rapids.

St. Louis-San Francisco

W. H. GIMSON, chief mechanical officer at Springfield, Mo., has retired. *Born:* Memphis, Tenn., September 13, 1887. *Career:* Began as a machinist assistant on the Frisco at Memphis on September 1, 1904. Subsequently became machinist apprentice; machinist; night roundhouse foreman; division foreman at Harvard, Ark.; general foreman at Monett, Mo.; and shop superintendent and master mechanic at Tulsa, Okla. Appointed assistant superintendent of motive power at Springfield in 1945; superintendent of motive power in 1948, and chief mechanical officer in 1951.

E. F. TUCK, superintendent of motive power at Springfield, Mo., appointed chief mechanical officer. *Born:* Cleburne, Tex., May 5, 1898. *Career:* Machinist apprentice and apprentice instructor on the Atchison, Topeka & Santa Fe at Cleburne from March 1915 until July 1922. Entered the service of the StL-SF in October 1922, serving successively as general roundhouse foreman at Ft. Worth, Tex.; roundhouse foreman at Kansas City; general roundhouse foreman at Memphis; general foreman, locomotive shop, at Springfield, Mo.; master mechanic, assistant superintendent of motive power, and superintendent of motive power. *Associations:* Member Locomotive Maintenance Officers Association (Executive Committee 1954; Shop Planning Committee 1953); St. Louis Diesel Club (past president), and Southwestern Railway Diesel Club (first vice-president 1954).

E. F. Tuck

F. G. BAKER, diesel superintendent at Springfield, Mo., has retired.

THOMAS H. TEMPLE appointed diesel superintendent at Springfield, Mo. Previously district sales representative, Electro-Motive Division, General Motors Corporation, at St. Louis.

J. P. KNOX, general foreman-car department at Amory, Miss., appointed to newly created position of assistant superintendent, car department, at Springfield, Mo.

Southern

JOLLY S. COFER, assistant foreman roundhouse, appointed foreman erecting shop at Atlanta, Ga.

ROY C. JONES, foreman erecting shop at Atlanta, Ga., has retired.

SELECTED MOTIVE POWER AND CAR PERFORMANCE STATISTICS

FREIGHT SERVICE (DATA FROM I.C.C. M-211 AND M-240)

Item No.		Month of June 1954	Month of June 1953	6 months ended with June 1954	6 months ended with June 1953
3	Road locomotive miles (000) (M-211):				
3-05	Total, steam	5,851	12,491	38,217	74,946
3-06	Total, Diesel-electric	32,722	31,588	191,032	183,943
3-07	Total, electric	638	720	3,870	4,437
3-04	Total, locomotive-miles	39,356	44,857	233,712	263,687
4	Car-miles (000,000) (M-211):				
4-03	Loaded, total	1,500	1,684	8,891	9,945
4-06	Empty, total	899	926	5,233	5,403
6	Gross ton-miles-cars, contents and cabooses (000,000) (M-211):				
6-01	Total in coal-burning steam locomotive trains	11,996	22,391	74,907	133,739
6-02	Total in oil-burning steam locomotive trains	2,379	6,970	13,090	35,698
6-03	Total in Diesel-electric locomotive trains	90,850	88,784	527,330	515,197
6-04	Total in electric locomotive trains	2,002	2,068	11,904	12,592
6-06	Total in all trains	107,732	120,393	629,329	698,469
10	Averages per train-mile (excluding light trains) (M-211):				
10-01	Locomotive-miles (principal and helper)	1.02	1.03	1.02	1.03
10-02	Loaded freight car-miles	40.90	40.80	40.70	40.90
10-03	Empty freight car-miles	24.50	22.50	24.00	22.20
10-04	Total freight car-miles (excluding caboose)	65.40	63.30	64.70	63.10
10-05	Gross ton-miles (excluding locomotive and tender)	2,934	2,917	2,883	2,871
10-06	Net ton-miles	1,297	1,337	1,271	1,303
12	Net ton-miles per loaded car-mile (M-211)	31.70	32.80	31.20	31.80
13	Car-mile ratios (M-211):				
13-03	Per cent loaded of total freight car-miles	71.90	72.30	62.90	64.80
14	Averages per train hour (M-211):				
14-01	Train miles	18.50	17.90	18.90	18.20
14-02	Gross ton-miles (excluding locomotive and tender)	53,825	51,506	53,834	51,854
14	Car-miles per freight car day (M-240):				
14-01	Serviceable	43.20	46.80	42.00	45.60
14-02	All	40.70	44.60	39.80	43.50
15	Average net ton-miles per freight car-day (M-240)	807	942	781	897
17	Per cent of home cars of total freight cars on the line (M-240)	53.40	45.30	54.20	46.80

PASSENGER SERVICE (DATA FROM I.C.C. M-213)

3	Road motive-power miles (000):				
3-05	Steam	2,276	4,155	14,594	27,407
3-06	Diesel-electric	20,774	19,848	124,193	118,924
3-07	Electric	1,343	1,480	8,386	9,278
3-04	Total	24,393	25,484	147,175	155,609
4	Passenger-train car-miles (000):				
4-08	Total in all locomotive-propelled trains	246,412	258,659	1,469,527	1,565,400
4-09	Total in coal-burning steam locomotive trains	10,091	23,195	72,815	157,599
4-10	Total in oil-burning steam locomotive trains	10,963	15,414	51,078	88,198
4-11	Total in Diesel-electric locomotive trains	210,672	203,881	1,252,122	1,215,972
12	Total car-miles per train-miles	9.72	9.82	9.62	9.75

YARD SERVICE (DATA FROM I.C.C. M-215)

1	Freight yard switching locomotive-hours (000):				
1-01	Steam, coal-burning	306	593	1,923	3,607
1-02	Steam, oil-burning	60	113	323	674
1-03	Diesel-electric[1]	3,267	3,450	19,535	20,380
1-06	Total	3,642	4,175	21,840	24,788
2	Passenger yard switching hours (000):				
2-01	Steam, coal-burning	10	19	76	127
2-02	Steam, oil-burning	5	7	26	39
2-03	Diesel-electric[1]	251	249	1,527	1,533
2-06	Total	292	308	1,790	1,893
3	Hours per yard locomotive-day:				
3-01	Steam	5.00	7.10	4.80	6.60
3-02	Diesel-electric[1]	15.10	16.40	15.00	16.30
3-05	Serviceable	14.50	15.20	14.40	14.80
3-06	All locomotives (serviceable, unserviceable and stored)	12.50	13.40	12.30	13.00
4	Yard and train-switching locomotive-miles per 100 loaded freight car-miles	1.69	1.72	1.71	1.72
5	Yard and train-switching locomotive-miles per 100 passenger train car-miles (with locomotives)	.74	.74	.75	.75

[1]Excludes B and trailing A units.

IN MODERN RAILROADS...

WATSON-STILLMAN SOCKET-WELDING FITTINGS...

Prevent Pipe Failures ...And They're Easy to Install

Watson-Stillman Forged Steel Socket-Welding Fittings provide strong, tough, trouble-free joints for air brake piping and for steam, air, oil and water lines in railroad cars, yards and shops. They're drop-forged of high quality steel for maximum resistance to shock and vibration.

Installation is easy. Just slip the fitting over the pipe and weld. The deep socket supports and aligns the pipe. No need for tack welding, backing rings or special welding fixtures. The clean, outside-the-pipe fillet weld prevents the formation of welding icicles inside the pipe. And ample "come-and-go" in the socket makes fussy accurate measurement and cutting of pipe unnecessary.

For safe, reliable service...for greater protection against costly piping failures...install Watson-Stillman Forged Steel Socket-Welding Fittings. Available for schedule 40, 80, 160 and Double-Extra Heavy pipe in sizes ⅛" to 4". Fittings include elbows, tees, crosses, couplings, air brake flanges, unions and a variety of plugs and bushings.

Write for information today.

WATSON-STILLMAN FITTINGS DIVISION

H. K. PORTER COMPANY, INC.

Roselle, New Jersey

SUPPLY TRADE NOTES

BUDD COMPANY.—*C. Levon Eksergian*, executive engineer, will be awarded the George R. Henderson Medal by the Franklin Institute of the State of Pennsylvania at the Institute's Medal Day ceremonies, Wednesday, October 20. The citation to accompany the award reads: "In recognition of his invention and subsequent intensive development and application of the disk brake as applied to both self-propelled and high-speed passenger cars in railroad service on this continent and to some degree abroad."

AMERICAN BRAKE SHOE COMPANY, NATIONAL BEARING DIVISION.—*Norman Birch* has been appointed vice-president in charge of operations; *I. Eugene Cox*, vice-president in charge of engineering and development, and *Bernard Esarey*, works manager of the Meadville, Pa., plant. Messrs Birch and Cox will be located at division headquarters in St. Louis. Mr. Esarey continues also as chief engineer of the division.

SINTERMET DIVISION.—*Howard B. Huntress* has been appointed director of research of this newly organized division of American Brake Shoe at Mahwah, N. J. As a metallurgist in the Research Center at Mahwah, Mr. Huntress has been engaged in research in powder metallurgy on sintered metal friction materials since 1944.

■

GENERAL ELECTRIC COMPANY.—Two new managers in the marketing section of GE's Locomotive and Car Equipment Department are *Rembert C. Alley*, appointed manager of railroad equipment sales, and *Robert A. Williamson*, manager of railroad locomotive sales. Mr. Alley has been head of locomotive sales, and Mr. Williamson, acting marketing manager, for the past year.

R. C. Alley

R. A. Williamson

■

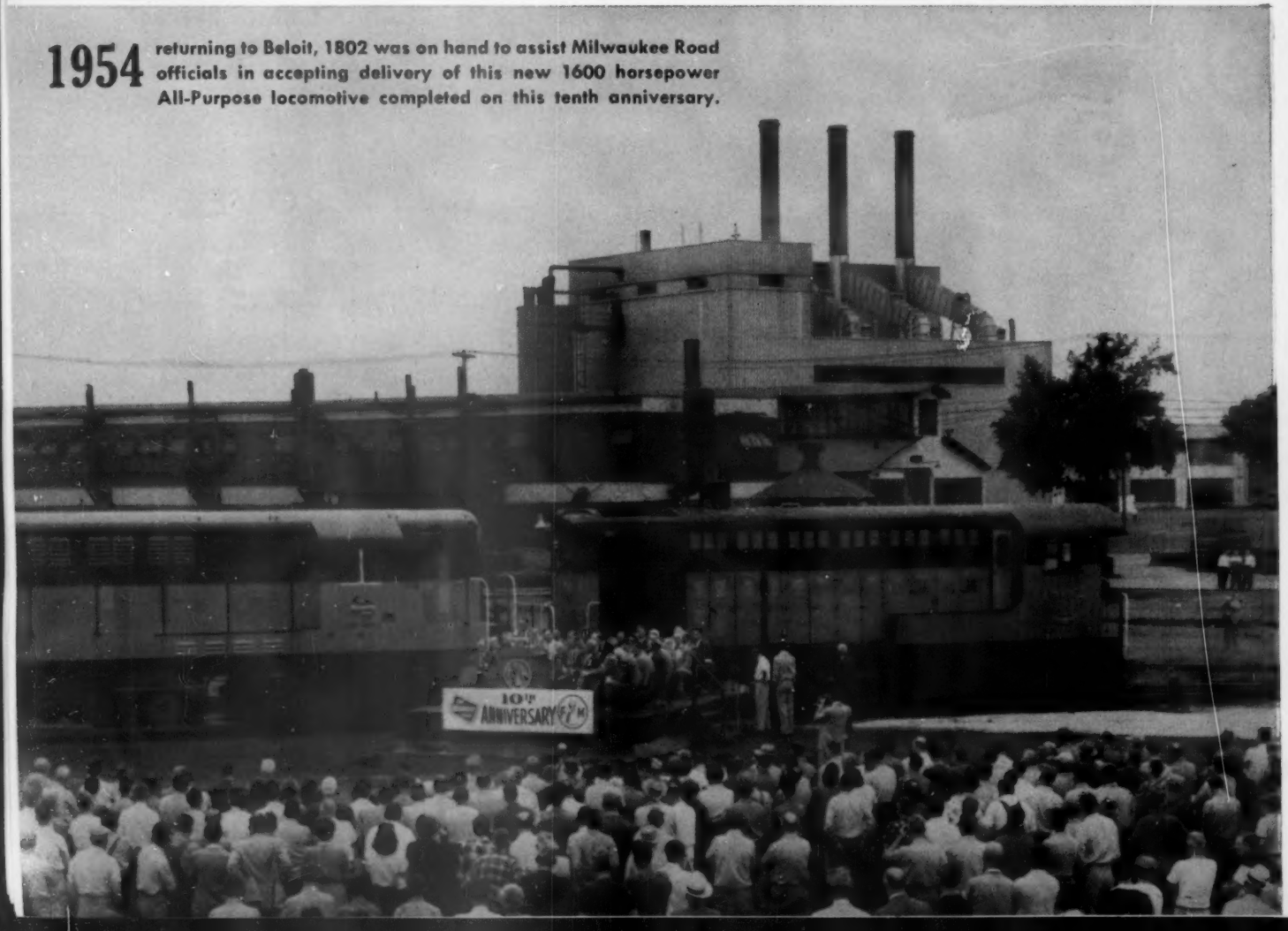
PENNSYLVANIA SALT MANUFACTURING COMPANY.—*Cooper M. Schley* has joined the sales organization, with headquarters in Birmingham, Ala. Mr. Schley will represent the Metal Processing and Maintenance Chemicals Departments in the southern territory.

■

PITTSBURGH PLATE GLASS COMPANY.—Plans have been announced for

(Continued on page 50)

A Decade of Fairbanks-Morse Diesel Power on the Milwaukee Road



1954 returning to Beloit, 1802 was on hand to assist Milwaukee Road officials in accepting delivery of this new 1600 horsepower All-Purpose locomotive completed on this tenth anniversary.

1944 10 years ago, engine number 1802 was delivered to the Milwaukee Road here in Beloit, Wisconsin. This 1000 horsepower switcher was the first Fairbanks-Morse locomotive—the start of Opposed-Piston power on the rails.

Ceremonies ten years ago marked delivery of the first Fairbanks-Morse locomotive built—the beginning of a decade of Opposed-Piston power on the Milwaukee Road.

Opposed-Piston performance, starting with that first 1000 horsepower switcher, is the reason the Milwaukee Road has steadily added O-P horsepower at a rate equal to a 1600 hp. unit—*every 30 days for 10 years.*

On their motive power roster you'll find a total of 125 Fairbanks-Morse units: Road Freight and Passenger locomotives, All-Purpose units—and a fleet of switchers that has set a new standard for low cost-per-hour yard service on the Milwaukee Road today.

In the past decade, Opposed-Piston locomotives have increased the vision of those seeking operating efficiency through dieselization.

Railroad management increasingly turns to today's trendmaker in the industry—Fairbanks-Morse.

Fairbanks, Morse & Co.
600 S. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE

a name worth remembering when you want the best

DIESEL LOCOMOTIVES, ENGINES • RAILCARS, RAILROAD EQUIPMENT • ELECTRICAL MACHINERY • PUMPS • SCALES • WATER SERVICE EQUIPMENT • HAMMER MILLS • MAGNETOS

A HAPPY RIDER IS LIKE A MAGNET

. . . because he (or she) attracts more happy riders. That's why equipment that makes passengers happy and comfortable, like automatic air-conditioning and suitable lighting, must operate dependably. Simplex Car Wire helps make sure it does.

Simplex Car Wire is small in diameter for easy installation in less space and light in weight for convenient handling. Despite its small size and light weight, it sacrifices none of the qualities of long life, ability to withstand vibration, and resistance to abrasion, acids, heat, oil, and moisture.

Simplex Car Wire is made with a special rubber insulating compound that readily withstands oxidation. It retains its physical and electrical properties even in the presence of water and extreme heat. A tough neoprene jacket protects it against service-encountered hazards.

To help insure reliable functioning of comfort-producing equipment for passengers, specify Simplex Car Wire. A letter to the Railroad Department at the address below, or an inquiry of your nearest Simplex representative, will bring more complete information. Write or call them today.

Simplex
CAR WIRE

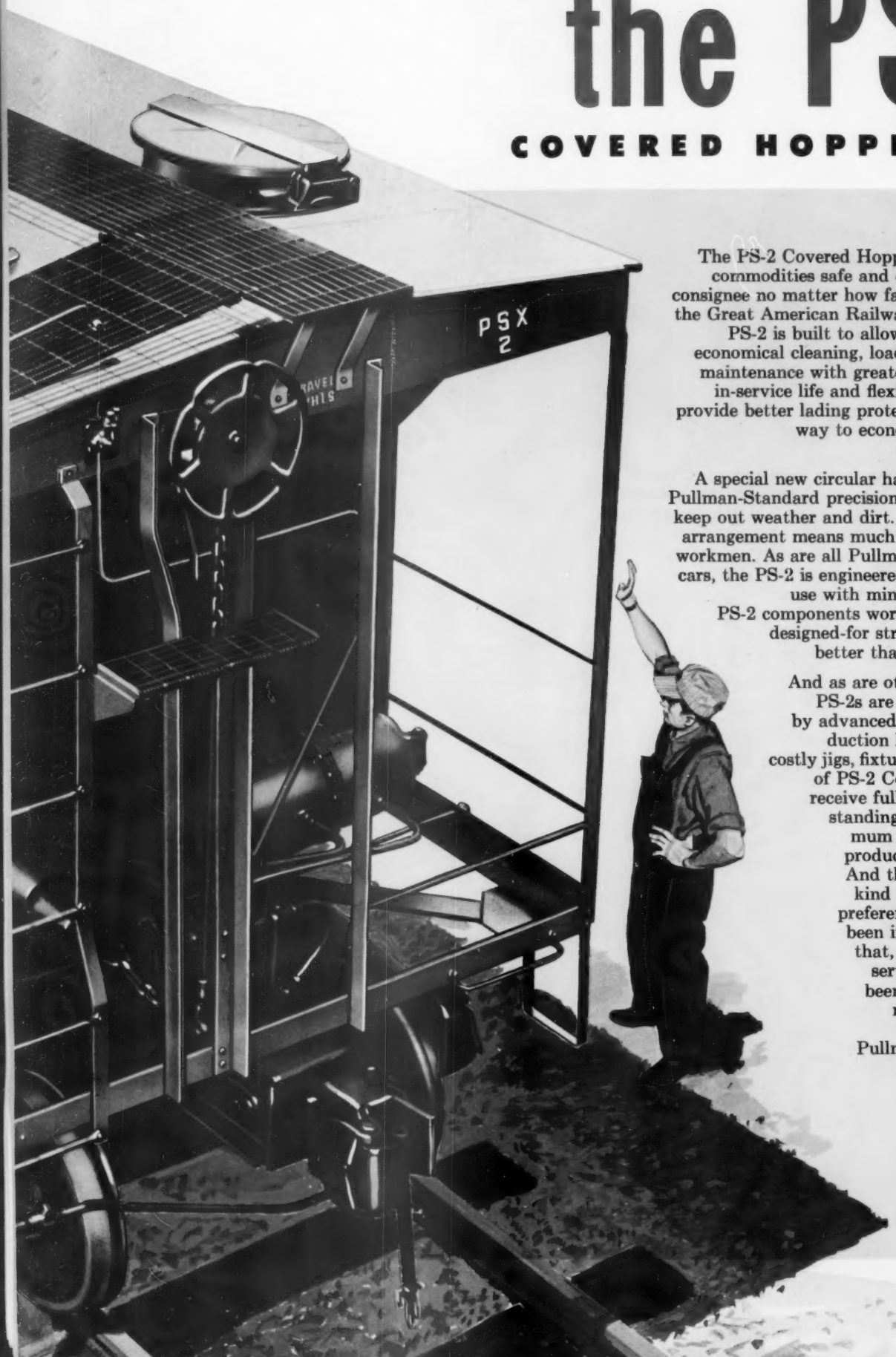
another product of

SIMPLEX WIRE & CABLE CO., 79 Sidney Street, Cambridge 39, Mass.


PS-2
covered hopper cars
BUILT TO SERVE
BEST ON THE
GREAT AMERICAN RAILWAY
System
BY PULLMAN-STANDARD

the PS-2

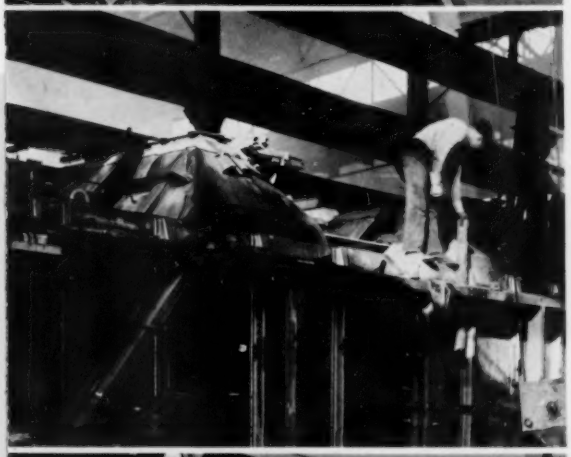
COVERED HOPPER CAR



The PS-2 Covered Hopper Car carries bulk commodities safe and dry from shipper to consignee no matter how far apart they are on the Great American Railway System. And the PS-2 is built to allow easier, safer, more economical cleaning, loading, unloading and maintenance with greater speed. Its longer in-service life and flexible standardization provide better lading protection and point the way to economical new avenues of railroad revenue.

A special new circular hatch is coupled with Pullman-Standard precision fabrication to help keep out weather and dirt. And the new hatch arrangement means much safer conditions for workmen. As are all Pullman-Standard freight cars, the PS-2 is engineered for long in-service use with minimum maintenance. PS-2 components work together to create designed-for strength that is vastly better than costly bulk alone.

And as are other PS freight cars, PS-2s are precision fabricated by advanced methods using production line techniques with costly jigs, fixtures and dies. Buyers of PS-2 Covered Hopper Cars receive full value through outstanding performance, minimum maintenance, major production-run economies. And they benefit from the kind of shipper-consignee preference that has already been indicated by the fact that, of the PS-2s now in service, over 1745 have been bought by thirteen railroads. Such individual usage verifies Pullman-Standard beliefs in the superiority of the PS-2 Covered Hopper Car.



PS-2 Covered Hopper Cars are available in three sizes . . . 2003, 2893 and 3132 cubic feet.

No matter which of the three sizes is selected, buyers are assured the features, durability and economy that are characteristic of all PS rolling stock. The standardized PS-2 includes continuous Research and Development (left, top) which submits cars and manufacturing processes to continuous tests and studies impossible for limited production cars.

PS multiphase production is important, too. Modern production methods (left, center) concentrate the specialized skills of highly trained craftsmen on segments of PS-2s as they pass from position-to-position during fabrication. Such multiphase production provides precision building at low cost.

And PS-2s are followed into the field for documented verification of their performance by Sales and Service Engineers. Inspections are made under actual operating conditions (left, bottom) and weaknesses or advantages reported to Pullman-Standard for consideration in future PS-2 Covered Hopper Cars.

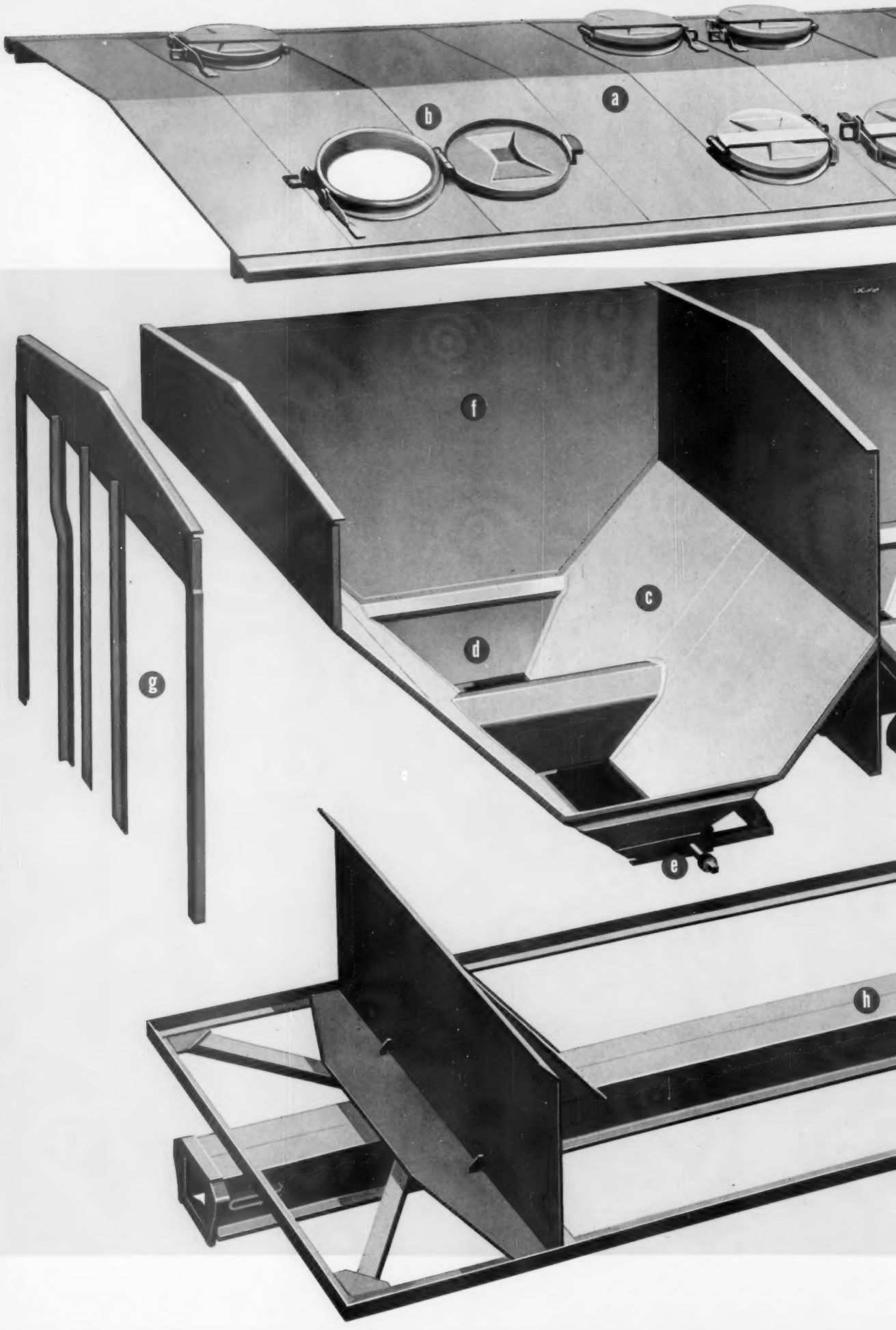
The success of the principle of standardization is demonstrated, individually and as a group, by the PS-2 Covered Hopper Cars serving The Great American Railway System.

1745 PS-2S TO 13 RAILROADS*

Southern Pacific · Pennsylvania · C.B.&Q. · New Haven · Maine Central · Wabash · Union Pacific

C.M.St.P.&P. · C.I.&L. · Western Maryland · A.T.&S.F. · Southern · C.R.I.&P.

*Plus 161 PS-2s to FOUR other USERS.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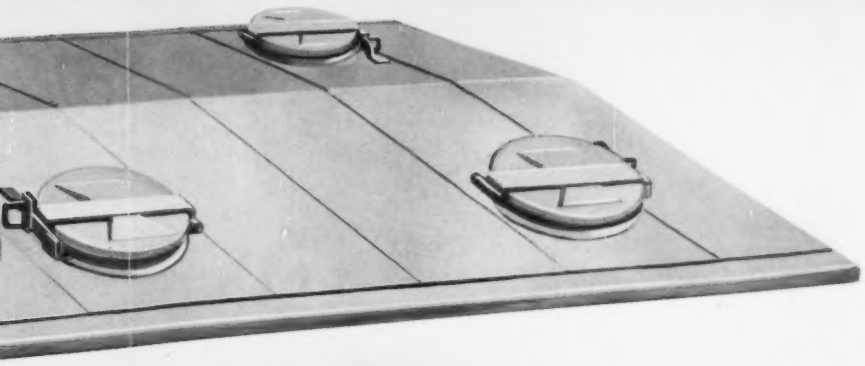
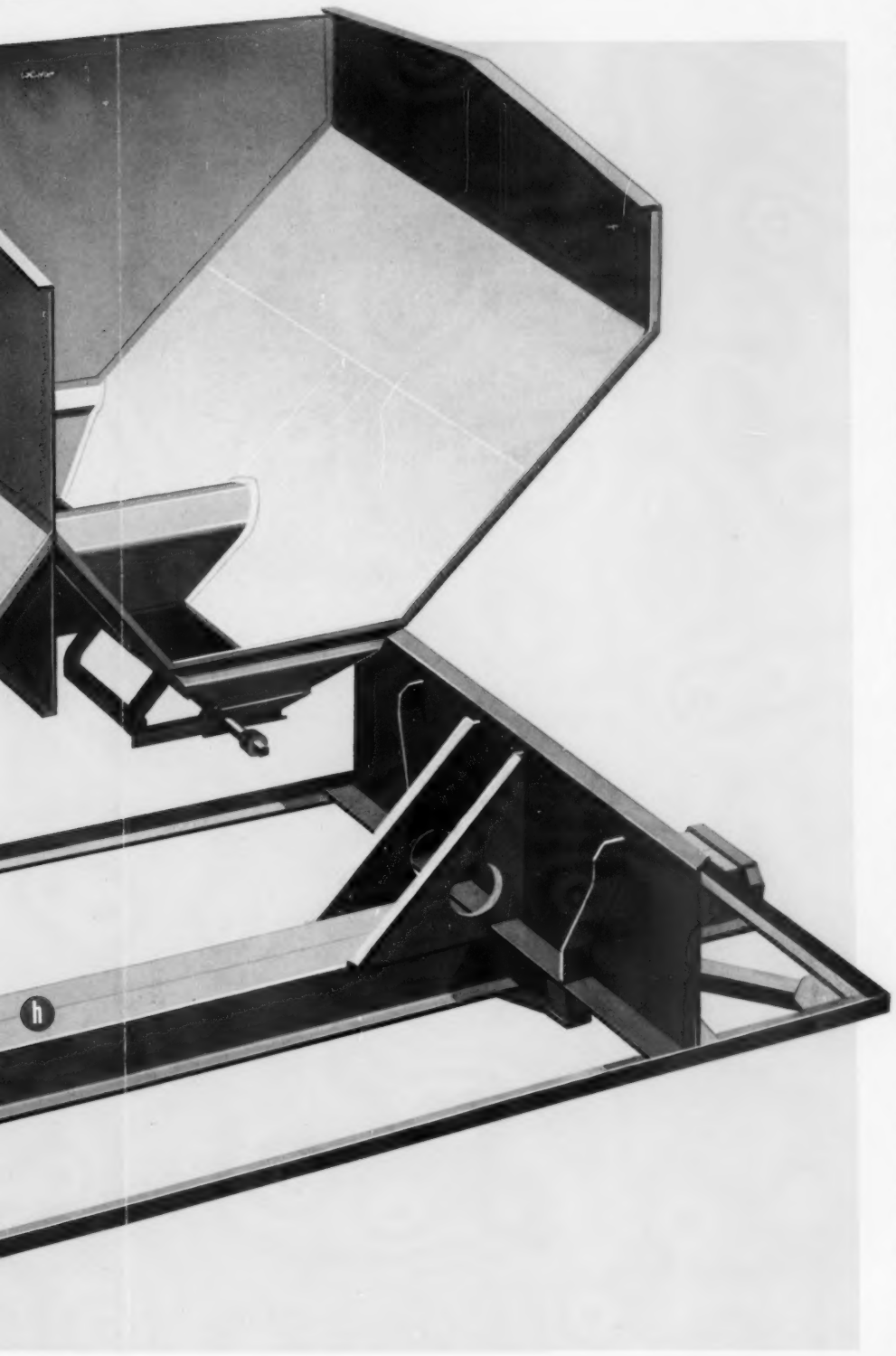




a **THE PS-2 ROOF.** Built up of roof sheets and carlines, the PS-2 roof can accommodate any number of hatches, wherever specified. Roof breakage is eliminated by use of new circular hatches. The roof is smooth, and has bulb angle side plates that eliminate catch-all ledge.

b **THE PS-2 HATCH AND HATCH COVER.** New circular hatches and covers prevent weather from being trapped against hatch sides, and forced up under covers, into lading. 6½" hatch combings facilitate roof cleaning. Hatch placement, and covers that open along the car's longitudinal axis, contribute to easy operation and worker safety. Hatch covers lock with special center pressure locking points that seal covers individually. Hinges are especially rugged, while latches are positive but easily reached and operated.

c **THE PS-2 FLOOR SHEETS.** Sloping floor sheets are of a 5/16" plate joined with longitudinal welds. Positioned for maximum capacity plus high speed unloading, floor sheets, as throughout the entire PS-2 interiors, contain no structural pockets or material retaining ledges or laps.

d **THE PS-2 HOPPER SHEETS.** Of ⅜" plate for outside sheets and 5/16" plate for inside sheets, these units are designed to facilitate unloading and withstand abrasive action and sledge-hammer blows. Like such other components as end plates, side sheets, end posts and corner posts, hopper sheets are readily available and properly designed for long service.

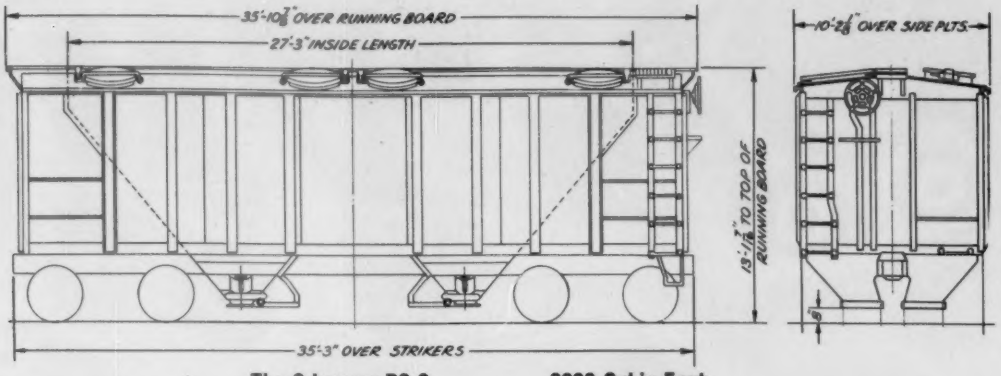
e **THE PS-2 HOPPER GATES.** Unloading gates are of standard design and construction. Hopper gates and chutes fit existing unloading accommodations. Location of chutes and gates within the rails permits easy, fast unloading of most granular materials into standard conveyors.

f **THE PS-2 SIDE.** Side has 4" bulb angle overhang at roof edge which keeps sides cleaner, lengthens paint life. The side sill is turned in to eliminate material retaining ledge. Sides are welded, eliminating possibility of corrosion and leakage around rivet holes. Heavier side sheets reduce unloading damage from sledging.

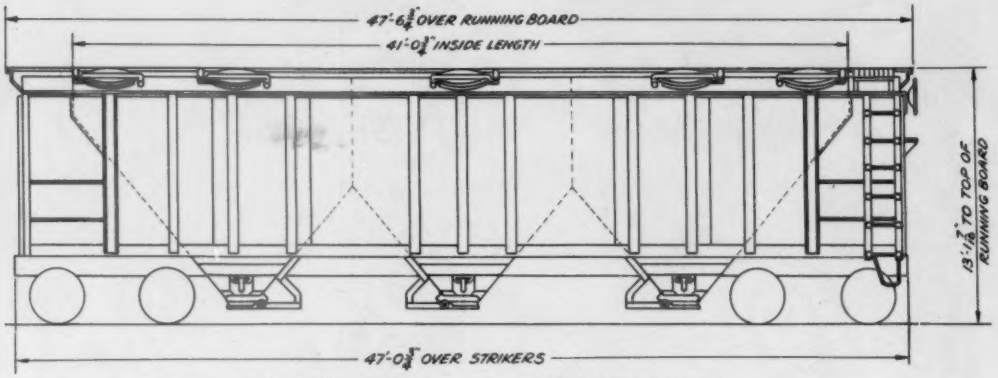
g **THE PS-2 END.** Ends are formed of a one-piece pressed 3/16" plate. They are designed for easier cleaning and painting, while safety is considered in the simplified ladder and step.

h **THE PS-2 UNDERFRAME.** PS-2 underframe components such as center, side and end sills, diagonal braces, body bolsters, body center plates, draft gear, couplers, strikers and front draft lugs are specially designed and tested for maximum strength under all types of lading and service conditions. All components are readily available and are easily maintained or replaced.

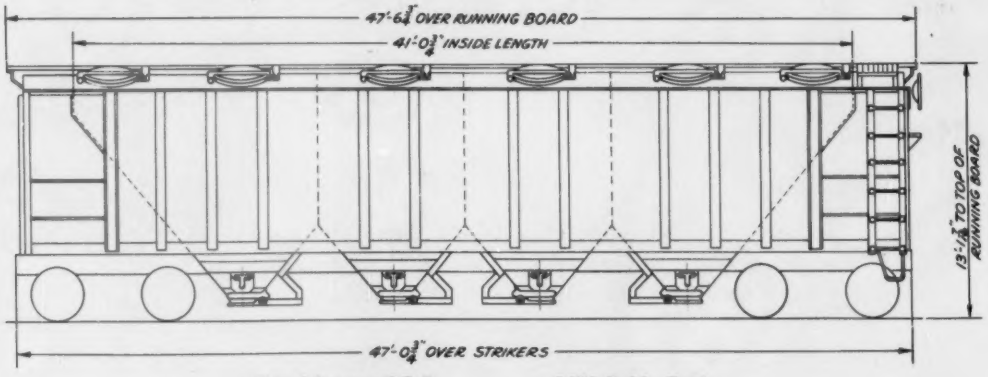
3 PS-2 Covered Hopper Car sizes offer capacity variations



The 2 hopper PS-2 **2003 Cubic Feet**



The 3 hopper PS-2 **2893 Cubic Feet**



The 4 hopper PS-2 **3132 Cubic Feet**

YOUR NEEDS CREATE THE PULLMAN "STANDARD"

PULLMAN-STANDARD

CAR MANUFACTURING COMPANY

SUBSIDIARY OF PULLMAN INCORPORATED

79 EAST ADAMS STREET, CHICAGO 3, ILLINOIS

BIRMINGHAM, PITTSBURGH, NEW YORK, SAN FRANCISCO, WASHINGTON

Printed in U.S.A. A-9460

SHELL TALONA R OIL 40

Fastest growing railway diesel lubricant in the U.S.A.

IN THE TWO YEARS SHELL TALONA R OIL 40 HAS BEEN AVAILABLE, THE VOLUME OF SHELL'S RAILWAY LUBRICANT BUSINESS HAS INCREASED 81%

One Big reason!

ENGINE WEAR

CUT ONE-THIRD

THROUGHOUT the railroad industry Shell Talona R Oil 40 is setting a new standard of anti-wear performance never before achieved or thought possible.

A recent survey on railroads shows that costs for engine cylinder maintenance are reduced considerably when Shell Talona R Oil 40 is used. The average saving was more than one third.

Manufactured from premium base oil plus compatible additives, Shell Talona R Oil 40 offers railroad operators these outstanding advantages:

1. **Superior anti-wear protection**
2. **Excellent detergent-dispersant action**
3. **Outstanding oxidation stability**
4. **Maximum engine performance**

In all types of railroad diesels Shell Talona R Oil 40 is the answer to reduced maintenance costs. See the Shell Railroad Service Engineer for additional details.

SHELL OIL COMPANY

50 West 50th Street, New York 20, New York

100 Bush Street, San Francisco 6, California · Shell Building, St. Louis 3, Missouri

SHELL

USS One-Wear Wrought Steel Wheels

start rolling here and keep rolling

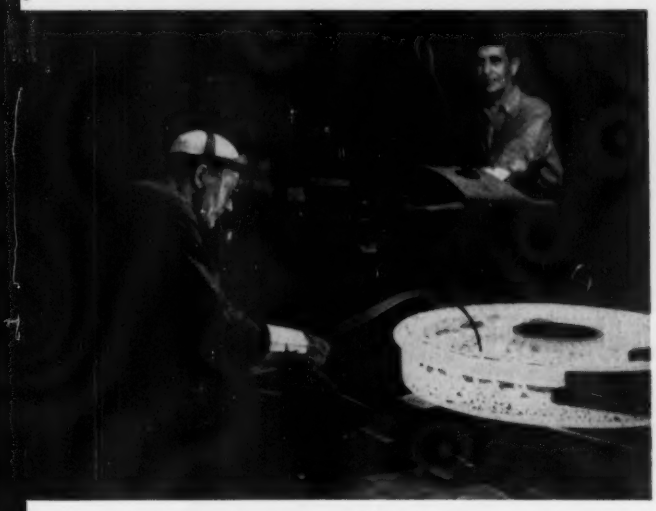
AS THE WHEEL BLANK SPINS on the mandrel, two powered rolls are rotated against the web, forcing the metal out against the tread-forming roll which shapes the tread and flange. The rim rolls, rotating against the rim, form it to the correct width and thickness.

safely for 200,000 miles or more

THIS is hot rolling—a critical step in the manufacture of USS One-Wear *Wrought* Steel Wheels.

The forged wheel blank, which has just been hub-punched and reheated, is brought from the furnace to the rolling mill by a charging machine. Giant tongs clamp onto the wheel and swing it into the rolls. As the hub lines up with the mandrel, the mandrel is shot into place. The driven rolls close on the wheel. The wheel begins to rotate. Suddenly, it's a whirling hot blur splashing pieces of hot scale through the air like a huge Fourth of July pinwheel. Perceptibly, the wheel increases in diameter as the rolls do their work. Then it slows and stops. Out goes the mandrel. The wheel, rolled to shape, is permanently identified by hot stamping—and is then on its way to the coning press, hub facing and rough boring machines, and final rigid inspection.

Controlled heating, forging, rolling and cooling produce uniformity in the structure of the steel and develop the desired hardness, ductility and strength —those qualities that make USS One-Wear *Wrought* Steel Wheels safer and more dependable than the ordinary wheel.



AFTER LEAVING the rolling mill each wheel is hot stamped with life long identification and its dimensions are checked against the required specifications with a set of king-size calipers.

USS ONE-WEAR *WROUGHT* STEEL WHEELS are your best investment because...

THEY LAST LONGER . . . USS One-Wear *Wrought* Steel Wheels will average 200,000 to 300,000 miles or more in normal freight car service.

THEY COST LESS . . . Their far greater life in any given service will reflect a *substantially lower annual cost* than that of the ordinary wheel, even though, initially, the USS One-Wear *Wrought* Steel Wheel costs a little more than the ordinary type wheel.

REQUIRE LESS MAINTENANCE...Rolling on USS One-Wear *Wrought* Steel Wheels, a car spends more time in *service* and less time on repair sidings, resulting in increased revenue to the railroad. Also, less frequent repair means reduced maintenance and lower labor costs.

SAVE UNSPRUNG WEIGHT . . . Because they are lighter than ordinary wheels, eight *Wrought* Steel Wheels under a 50-ton capacity car will save approximately 1,520 lbs. of unsprung weight, which is directly converted either into additional payload capacity or into savings due to the decreased load. Furthermore, reduced unsprung weight means less damaging impact on the track system.

Two strategically located complete wheel shops are ready to fill your orders for *Wrought* Steel Wheels: McKees Rocks (Pittsburgh), Pennsylvania shop, serving the East and Southeast, and the Gary, Indiana shop, supplying the Western and Southern Lines.

USS WROUGHT STEEL WHEELS

UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.

USS

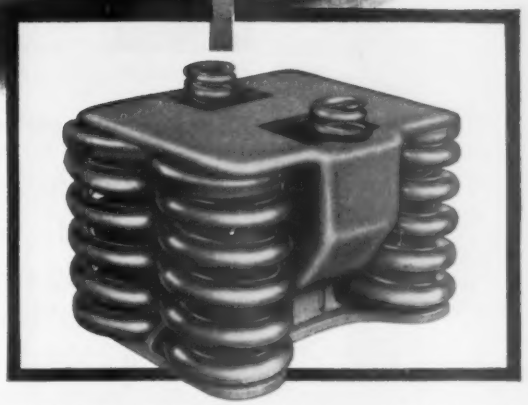
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

4-2007

UNITED STATES STEEL

NATIONAL SNUBBER PACKAGES

give your old cars a smooth friction-controlled ride



NATIONAL SNUBBER PACKAGE uses AAR Alternate Standard 2½" deflection springs (coupler still remains below maximum permissible height of 34½"). The Snubber Package is supplied without load springs, unless otherwise specified.

Now you can equip your old freight cars with National Snubber Packages that operate on the same friction-control principle (with the same extra-large friction surfaces to reduce wear) as the National C-1 truck. The riding qualities of this outstanding car truck can now be obtained in the National Snubber Package.

This Snubber Package fits between most narrow side-frame columns, and can be applied to approximately 90 percent of old non-friction-control trucks in service.

For more *and satisfied* shippers use National Snubber Packages!

A-9747

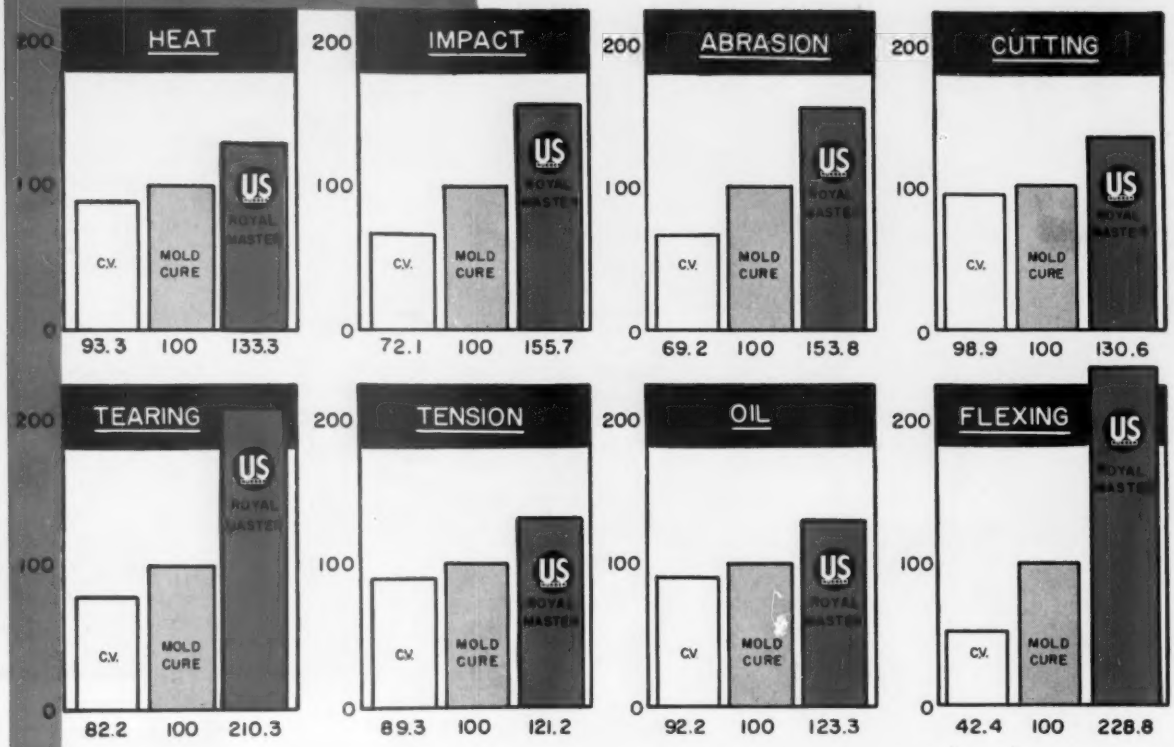
NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Cleveland 6, Ohio

COUPLERS • YOKES • DRAFT GEARS • FREIGHT TRUCKS • SNUBBER PACKAGES • JOURNAL BOXES and LIDS

"Progress through Research"

New U.S. ROYAL outperforms,



Comparative performance of portable cords related to major life factors.

Graphs illustrate the outstanding superiority of new U. S. Royal Master Cord—over the average of molded cords and the average of short-lived continuous vulcanized cords of other makes—on every major life factor. (Average of other molded cords is rated at 100%.)

US RUBBER

UNITED STATES

ELECTRICAL WIRE AND CABLE DEPARTMENT

MASTER portable cord *outlasts all others!*

Comparative tests show U. S. Royal Master gives $1.88 in value for every $1.00 spent — almost *twice* the service value of the average of other molded cords!

Two years ago, "U. S." engineers began a *complete reexamination* of portable cord construction, service life, and the causes of cord failure.

Over 10,000 tests were made. More than a thousand cords of all leading makes, including our own famous U. S. Royal Cord, were analyzed, tested, and compared.

Every life factor was considered and carefully evaluated, alone and in its relation to overall cord performance and service life.

Backed by 64 years of experience in the manufacture of electrical wire and cable, U. S. Rubber engineers then translated their findings into an entirely new portable cord, designed to surpass any other previously made.

Extensive tests, both in the laboratory and in outside plant installations have proved this new portable cord startlingly superior in every respect!

New U. S. Royal Master is unquestionably the finest cord you can buy!

From every standpoint, as the charts at left illustrate, new U. S. Royal Master is a finer, more durable cord—actually gives 88% longer life than the average of competitive molded cords—far longer than *any* other cord—surpassing even a hypothetical cord incorporating the best features of all those tested!

Far greater value, too! In spite of almost doubled service life, this great new cord is in the same price category as other molded cords—giving you $1.88 in cord value for every cord $1.00!

Prove to yourself the outstanding superiority of new U. S. Royal Master Portable Cord — in both service life *and* economy! Get in touch with your "U. S." distributor today!

Approved by Underwriters' Laboratories, Inc.

RUBBER COMPANY

ROCKEFELLER CENTER, NEW YORK 20, N. Y.

NATIONAL OIL SEALS *help*

keep the roll in roller freight

National Oil Seals are vital to the smooth, trouble-free operation railroads enjoy with roller bearing journal boxes. Mounted inside the journal box, these precision seals keep lubricant in—dirt, dust and water out. Uniform sealing is assured under all conditions, even winter blizzards, desert sand storms or immersion of the journal in water.

Like roller bearing journal assemblies themselves, National Oil Seals are rolling in over 85,000 freight car journal boxes; rolling millions of miles without malfunction or replacement. They are playing an important role in the success of roller bearing railway journals—and the elimination of costly hot boxes.

NATIONAL MOTOR BEARING CO., INC.

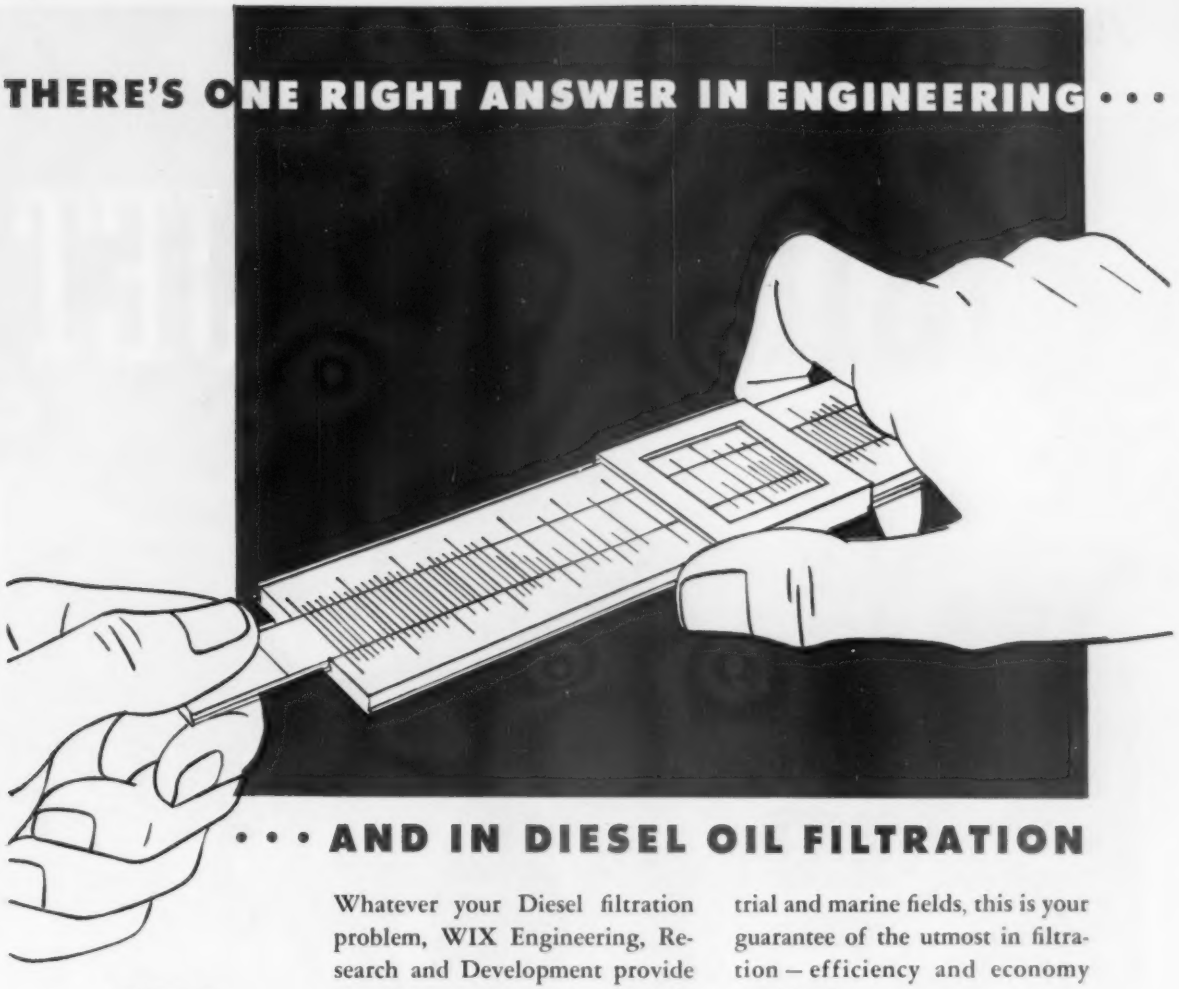
General Offices: Redwood City, California. **Sales Offices:** Chicago, Cleveland, Dallas, Detroit, Downey (Los Angeles County), Milwaukee, Newark, Van Wert, Wichita. **Plants:** Redwood City, Downey and Long Beach, California; Van Wert, Ohio.

NATIONAL
OIL & GREASE SEALS
O-RINGS SHIMS
®

Original equipment on cars, trucks, buses, tractors, railway rolling stock, machinery and appliances.

3136

THERE'S ONE RIGHT ANSWER IN ENGINEERING • • •



• • • AND IN DIESEL OIL FILTRATION

Whatever your Diesel filtration problem, WIX Engineering, Research and Development provide the right answer with slide-rule precision. For fuel or lube oil, yard engine or main line locomotive, varying operating or climatic conditions, WIX Oil Filter Cartridges stand out in quality and service.

WIX performs all manufacturing operations, carefully supervises every step from raw material to finished Product. Supported by extensive Laboratory facilities and constant field testing, and with the benefit of many years' experience in the railroad, automotive, industrial and marine fields, this is your guarantee of the utmost in filtration – efficiency and economy combined.

Tested WIX Filtrants keep oil cleaner for far longer periods. WIX Engineered Cartridge construction assures precise fit, ease of installation and extended service. And, WIX warehouse stocks provide convenient, immediate service.

Let WIX Engineering solve your filtration problems with Cartridges designed for the conditions under which your Diesels operate. Write for complete information today.

ENGINEERED FILTRATION

Selection of "Prescription" Filtrants: Cotton Threads, Blended Cotton Threads, Felted Paper.

●

Uniform volume, density packed in one-piece Sock. Integral End-Seal or Grip-Seal Cartridge construction.

●

Spring-reinforced center tube, slotted for greater, more even flow rates.

●

Tin-plated metal parts. Bale-type handles for easy installation and servicing.

ENGINEERED wix FILTRATION

WIX CORPORATION • • • • • GASTONIA • N • C

WAREHOUSES

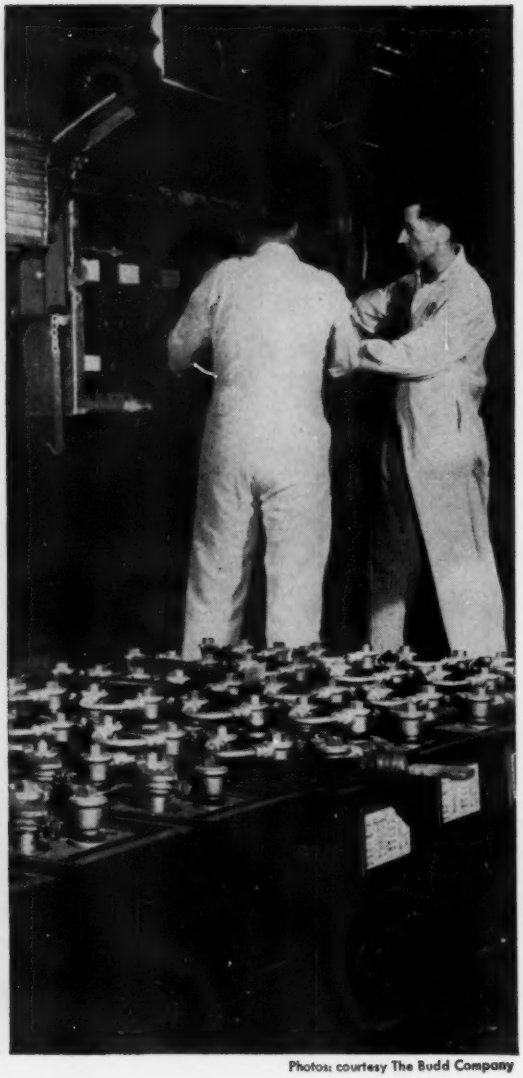
GASTONIA • NEW YORK • SACRAMENTO
ATLANTA • DES MOINES • ST. LOUIS

LUBRICANT-TM

Since its introduction in 1952, Sinclair JET Lubricant—TM has reached that acme of acceptance where it is now being used by many of the nation's most prominent railroads. The emblems shown represent only part of the total number of railroads using this All-Year Lubricant. Actually, *more than 70 railroads are using* JET Lubricant—TM. Isn't it time you, too, investigated the advantages of this top quality railroad lubricant?

Contact Sinclair Refining Company,
Railway Sales
New York, Chicago, St. Louis, Houston

SINCLAIR RAILROAD LUBRICANTS



Photos: courtesy The Budd Company

Passenger comfort, unlimited

Today's modern air-conditioned passenger cars call for simple and reliable apparatus which must provide dependable service at the lowest over-all cost. That's why it's so important to investigate the tremendous advantages in EDISON batteries for standby power for the electrical systems of these cars. They are of steel-cell construction, built to take rugged handling like no other kind of battery construction can.

Electrically, too, EDISON batteries are profitably different—they have no prescribed discharge limits and, therefore, operate self-regulating a-c inversion apparatus correspondingly longer without injury to the battery. Recovery after discharge is usually just as rapid as generator output permits, resulting in high road capacity and virtual elimination of yard charging.

Roads using as many as 2000 sets of EDISON batteries in both air-conditioned and non-air-conditioned cars report average service life ranging from 18 to 26 years. Find out now about EDISON'S exclusive advantages by sending for our bulletin 3802 and requesting a visit from the Edison field engineer nearest you. Write Edison Storage Battery Division, Thomas A. Edison, Incorporated, West Orange, New Jersey.

Most dependable power . . .
lowest over-all cost
you get both with an EDISON

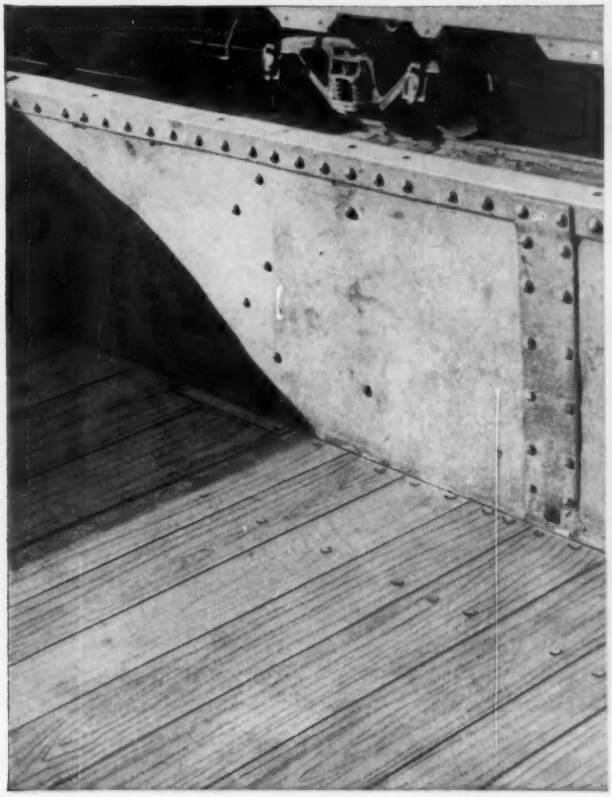
EDISON
Nickel • Iron • Alkaline
STORAGE BATTERIES

EDISON ALSO MAKES THE FAMOUS "V.P." VOICEWRITER AND THE TELEVOICE SYSTEM

PENTA

DOW

CLEAN WOOD PRESERVATIVE PROTECTS B & O CAR LUMBER AGAINST COSTLY HIDDEN DECAY



Maintenance-conscious Baltimore and Ohio Railroad now keeps gondolas and flatcars working months longer between trips to the repair shop. Clean PENTA* wood preservative measurably adds to the serviceability of this great railway's car flooring and framing. Off-track time and lumber replacement costs are held down because PENTA affords positive protection against rot, helps lumber stand up to the mechanical wear normally accelerated by this hidden decay.

Stock pens, loading chutes, platforms and other structures, too, stay safe and fully serviceable much longer when wood is pressure-processed with PENTA.

Combined with this long-lasting effectiveness is PENTA's *cleanliness*—lumber looks more attractive without painting, and is much easier to handle in every way.

Be sure to include PENTA in your specifications for *both* new car construction and all repair lumber—you'll receive greater ton mileage for every dollar invested. For more information about clean, measurable *PENTAchlorophenol protection, write to THE DOW CHEMICAL COMPANY, Midland, Michigan.

THE DOW CHEMICAL COMPANY
Dept. PE-754H-1 Midland, Michigan

Please send me:

☐ List of PENTA-treating plants.

☐ Literature on car lumber treatment.

Name_____

Title_____

Company_____

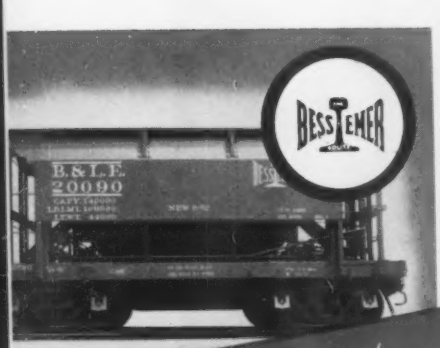
Address_____

City_____ State_____

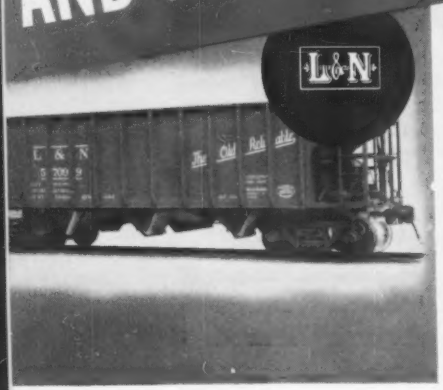
you can depend on DOW CHEMICALS

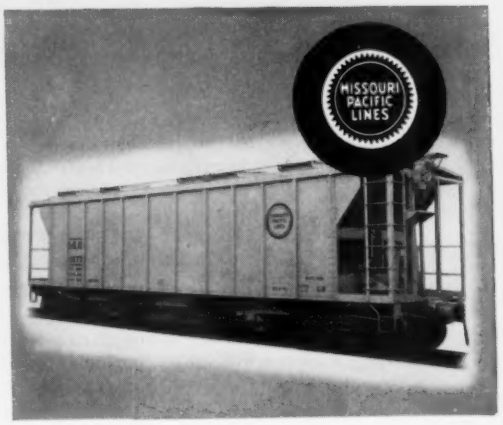
DOW

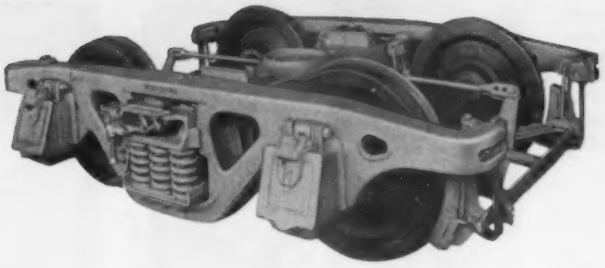
For New Ore



AND NOW... RESERVE MINING COMPANY CHOOSES A-3's FOR 350 ORE CARS
QNSL ORDERS 850 ADDITIONAL CARSETS







Cars

Specify smooth-riding Ride-Control® Trucks that are tailor-made for your operations!

Rarely will you find two ore-hauling problems that are entirely alike. That's why practically all major ore shippers specify Ride-Control Trucks. They know that ASF is the only truck-design specialist in a field where specialization insures the *right equipment for the job.*

Heavy loads and severe grades present many problems. For example, the car must be compact—requiring a truck with carefully designed members and often with odd-size wheel base. Brake design, whether clasp or single shoe, must be *integrated* with truck design . . . a problem on which ASF's combined staff of truck and brake engineers can offer you constructive help. And last but not least, the truck has to ride smoothly so that the car will *work together with the roadbed,* instead of pounding itself into the repair shop.

In short, by any yardstick you use—past experience or present engineering facilities—ASF is in a unique position to design the truck that's right for *your* requirements!

RIDE-CONTROL, A-3

Application based on ASF experience with ore car truck design

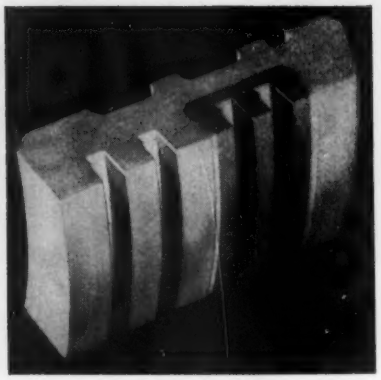
Railroad	Carsets
Bessemer & Lake Erie	1,200
Chicago & North Western	300
Duluth, Missabe & Iron Range	5,500
Electro Metallurgical	41
Great Northern	700
Gulf, Mobile & Ohio	100
Louisville & Nashville	252
Soo Line	100
Northern Pacific	600
Orinoco Mining	560
Quebec, No. Shore & Labrador	1,200*
TOTAL	~~10,853~~ New Total 11,753

*Made in Canada

ASF

AMERICAN STEEL FOUNDRIES
410 N. Michigan Avenue, Chicago 11, Illinois
Canadian Sales: International Equipment Co., Ltd., Montreal 1, Quebec

A Ni-Resist Ring Band is an integral part of this forged aluminum piston for Nordberg 11- and 12-cylinder Radial engines. Sectional view indicates the relatively small amount of Ni-Resist needed for the insert which is bonded to the aluminum alloy.



Ring bands of NI-RESIST in aluminum pistons

Increase Output...Cut Maintenance

A major problem with engines equipped with aluminum alloy pistons is the high rate of wear that tends to occur in the ring area.

Wear is particularly severe in the top ring groove, which is exposed to the most heat, receives the least lubrication and is attacked by abrasive dust and dirt coming through the intake. "Blow-by" caused by excessive ring groove wear in the aluminum piston means loss of power and increased oil consumption.

There's one answer to these troubles. Wear resistance . . . the answer given by aluminum alloy pistons with ring bands of NI-RESIST®. The high expansion properties of Ni-Resist prevent warping and failure of the joint between the two metals.

You will find it pays to specify aluminum pistons with Ni-Resist ring bands in all heavy-duty engines for truck, bus, locomotive, marine and aircraft, as well as stationary power plant use.

Performance records show increased power per cylinder as well as improved piston life, because Ni-Resist defeats heat, corrosion, metal-to-metal wear and galling. Under current trends to raise engine output by increasing temperatures and using chemically treated fuels, the advantages offered by Ni-Resist mean extra engine economy. A truck fleet operator reports an average of 250,000 miles per set with this type of piston in his vehicles.

Consider Ni-Resist for many other engine applications. These include exhaust valve guides, exhaust seat rings and ball joints, exhaust manifolds...cylinder liners ...connector rings, water pump impellers and bodies.

Several types of Ni-Resist are available to meet a variety of industrial demands. In fact, no other cast metal provides such a useful combination of engineering properties. Get full information . . . mail the coupon now.

EMBLEM OF INCO SERVICE

The International Nickel Company, Inc.
67 Wall Street, New York 5, N. Y.
Please send me booklets entitled "Engineering Properties and Applications of Ni-Resist" and "Buyers' Guide for Ni-Resist castings."

Name_____

Title_____

Company_____

Address_____

City_____ State_____

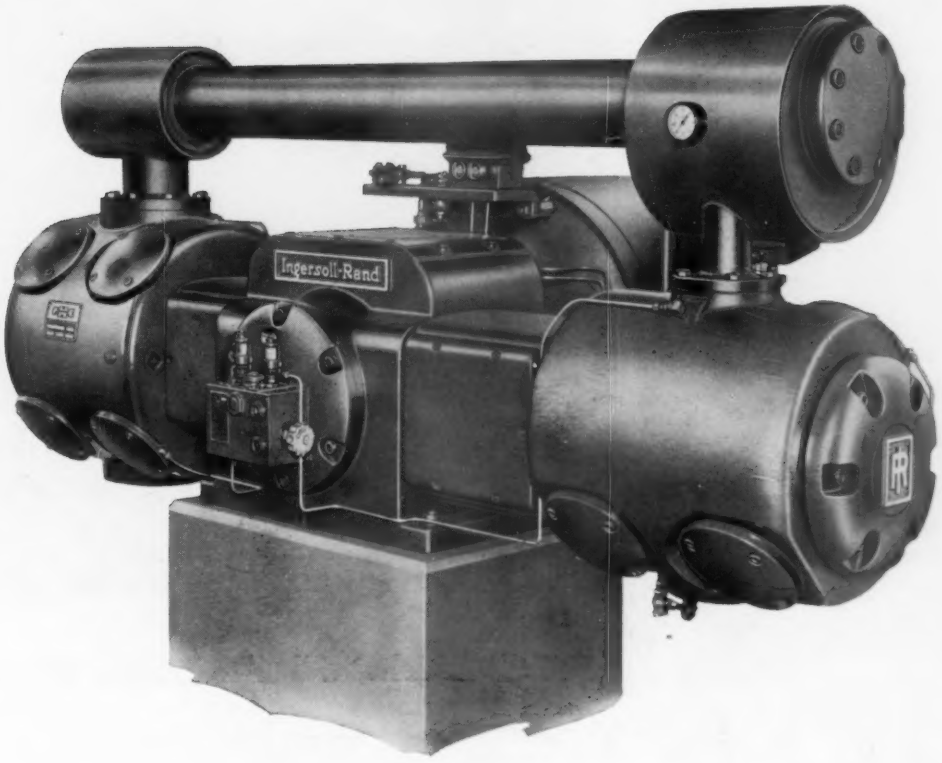
THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

NEW

OPPOSED-CYLINDER

BALANCED DESIGN, TYPE PHE

COMPRESSOR



COMPACT, SPACE-SAVING PACKAGED DESIGN

The new, space-saving PHE design marks another Ingersoll-Rand achievement in electric-driven compressors. Built for continuous, heavy-duty service, it includes the following outstanding features: Opposed pistons with excellent running balance – Efficient tube-type intercooler–New cylinders with Type A Channel Valves–Motor mounted directly on crankshaft–Full floating aluminum main and crank-pin bearings – Sealed crankcase – Force-feed lubrication.

FOR EASY SHIPMENT, INSTALLATION & RELOCATION

Shipped completely assembled and ready to run, the PHE compressor can be easily installed–in very little floor space–with a minimum of piping–and on a simple inexpensive foundation. Relocation, if required, is equally simple.

ELECTRIC-DRIVEN 75 AND 100 HP SIZES

The basic design is a two-stage unit for 80-125 psi. For other pressures, or for pumping vacuums, alternate cylinder arrangements can be supplied. It will pay you to get all the facts on this new, cost-saving design. Ask for Bulletin No. 3155.

Ingersoll-Rand

1-106 11 Broadway, New York 4, N. Y.

COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • DIESEL AND GAS ENGINES

MODERN REBUILDS FOR

and you get a new

You can Unit-Exchange a 5-year-old traction motor (or any other General Motors Diesel locomotive major component) and get a fully warranted Electro-Motive factory rebuild that performs better and lasts longer than your old unit did when first built.

That's because of Electro-Motive's long-established policy that "every component built for a locomotive today must fit a locomotive of the same class built yesterday and make a better locomotive out of it."

That means that through EMD Unit Exchange, General Motors Locomotives get new parts in old components—new parts that give you the improved performance and longer life from your old units that you get from your newest General Motors Locomotives.

But you get more than latest improvements with EMD Unit Exchange.

ELECTRO-MOTIVE DIVISION

La Grange, Illinois • Home of the Diesel Locomotive

WORN COMPONENTS

performance warranty

You get factory rebuilds warranted from date of installation for 100,000 miles or one year's service, whichever occurs first.

You get fast delivery—24 hours in emergencies—from any one of our eight Unit Exchange Warehouses located at key railroad centers across the country.

You get cost savings, too, because you pay low, flat-rate published charges only for the labor and materials needed to restore your worn unit to top condition.

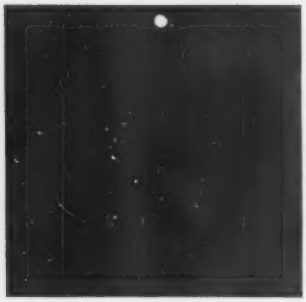
All this adds up to what we've been saying since we first started Unit Exchange:

EMD Unit Exchange gives you better rebuilds, faster, at lower cost.

For more details, call your Electro-Motive representative or write:

GENERAL MOTORS

GENERAL MOTORS LOCOMOTIVES



Here is a test panel painted by the standard freight car paint system. The paint is on tight... free from blisters or cracks.

The same panel one minute after applying Pennsalt Cleaner 23. The paint is already loosening—even beginning to peel in spots.

Two minutes later. The paint is blistered, has not only been loosened completely, but most of it is ready to sluff away.

Three minutes later, the test is complete. The paint is gone, leaving the bare metal. The surface has rinsed clean...ready for inspection and repainting.

Make the 3-Minute Paint Stripper Test

3-Minute Timer Shows How Pennsalt Cleaner 23 strips paint from a standard freight car panel in 3 minutes . . . leaves bare metal ready for repainting.

Test Pennsalt Cleaner 23 against any other paint stripper you have ever used in your shop. Test it on any paint job, any car going through the line. Time it—and compare speed, completeness, economy.

Pennsalt Cleaner 23 can be applied by the Stripping-Rack Method, the Spot Application Method, or by the Soak-Tank Method.

• **Removes any number of coats of paint**—Pennsalt Cleaner 23 will tackle your heaviest jobs—strip cars and locomotives with 3 coats or 20 on them. This powerful blended alkali compound is ideal for tight production schedules.

• **Saves money**—Economical because it strips clean. Economical because it rinses freely without streaking, or leaving white deposits. *And it costs less than 5c a gallon of prepared paint-stripper solution.*

• **Get the complete story**—We'll be glad to send you full information on Pennsalt Cleaner 23—including a free blueprint of a paint stripping rack you can make up in your own shop. Just call the Pennsalt Railroad Service Representative in your area. Or write: Railroad Maintenance, Pennsylvania Salt Mfg. Co. *EAST:* 859 Widener Bldg., Philadelphia 7, Pa. *WEST:* Woolsey Bldg., 2168 Shattuck Ave., Berkeley 4, Calif.

Pennsalt Chemicals

Something to keep in mind . . .

Maintenance costs take a nose dive when diesel engines are equipped with solid aluminum bearings!

Over one hundred aluminum half-shells in each engine! That's how Fairbanks-Morse feel about aluminum bearings. They tested many different types of bearings but settled on solid aluminum because of the many proven advantages of this material.

With Alcoa® Aluminum Bearings, their earlier model diesel engines were giving many times longer life with less down-time. Maintenance costs literally "nose-dived". That's why they specify a full engine set of these bearings in their great new *Train Master* Locomotive! Fifty-two bearings (one hundred four half-shells), including mains, connecting rods and thrust bearings are all Alcoa Aluminum!

These bearings last longer because they move heat fast—eliminate hot spots. They offer the ultimate in corrosion resistance and have extremely high load-carrying ability. They are solid bearing metal all the way through so there are no hard backings to score expensive shafts. For the whole story on this NEW way to slash rising maintenance costs, write: ALUMINUM COMPANY OF AMERICA, 1986-K Alcoa Bldg., Pittsburgh 19, Pa.

ALCOA ALUMINUM

ALUMINUM COMPANY OF AMERICA

Condensed Story of the Improved Chilled Car Wheel

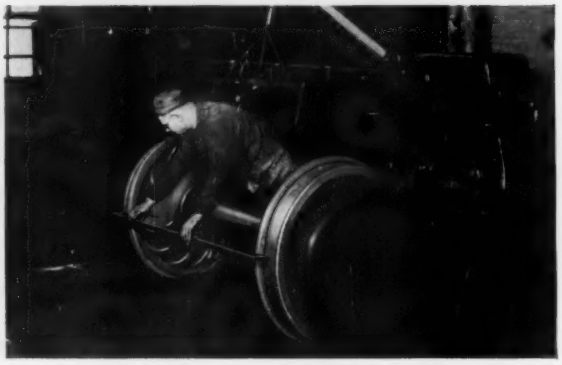
The availability, cost, and performance of the chilled car wheel have enabled it to maintain supremacy through the evolution from light loads in the early days to the heaviest loads that the rails can carry today. Approximately 54% of all freight cars in the U. S. and Canada are equipped with chilled car wheels, and it is estimated that there are over 10 million chilled car wheels in service.

Production of chilled car wheels in 22 cities throughout the U. S. assures quick, low cost delivery from the AMCCW plant near you.

The value of the chilled car wheel may be explained by the many direct and indirect savings which are credited to its use. Most direct and tangible is the almost 50% saving in first cost, whether for new cars or for repairs.

Chilled car wheels used for repairs or maintenance are usually sold on a conversion basis, whereby the purchaser exchanges an equal tonnage of scrap wheels for new ones and pays only for the conversion cost. This exchange feature eliminates the scrap wheel problem. It assures a ready outlet for scrap wheels.

Storehouse costs are lower because the proximity of foundries prepared to make immediate delivery obviates the need for carrying a large stock of wheels. This proximity of wheel foundries is also an important factor in reduced shipping charges.



After mounting, usually at 50 to 60 tons pressure, wheels are measured at three points to check accuracy of gage, alignment and direction of bore.

Besides the advantages inherent in the location of AMCCW plants, the characteristics of the chilled car wheel, with its blend of hard chilled iron at the tread and softer gray iron at the hub, offer definite benefits in service. Some of these are noted below:

Hub metal is soft gray iron easily machinable, thus insuring lowest cost for labor and machinery in the fitting of wheels to axles.

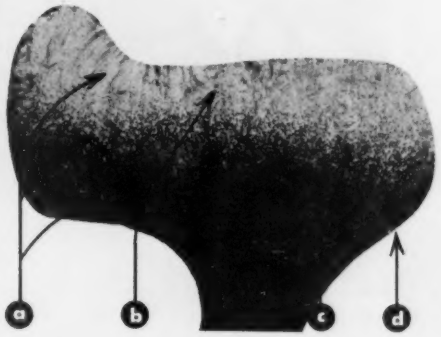
Compressive strength is unexcelled, hence the heaviest loads can be carried with entire freedom from cold flowing of metal on tread surface.

Extreme hardness of the tread metal gives maximum amount of service with minimum loss of metal and assures retention of rotundity throughout the life of the wheel.

Mounting chilled wheels on axles is less critical due to the relatively low modulus of elasticity of cast iron, hence greater variation in fitting allowance can safely be tolerated. Records show that the probability of chilled wheels coming loose on axles is less than that of wheels of other metal.

Tests show that stress concentration in wheel seat of axle is lower when the softer gray iron hub is pressed on the axle—hence axle failures in the wheel seat are practically unknown when chilled wheels are used.

The damping property of cast iron is five times greater than that of metal used for wheels of other types. This

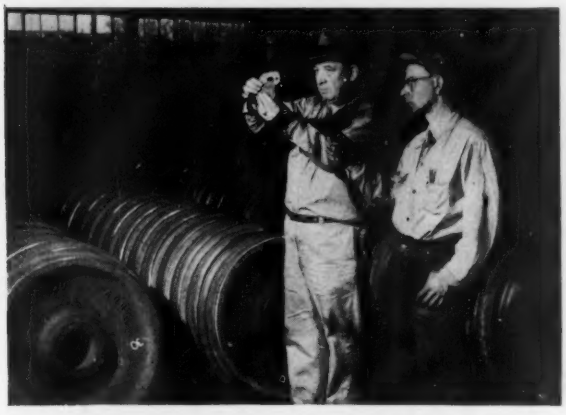


Though the contour of the tread was redesigned in the 1950 wheel, improvements have been continuous over many years. For instance, in the past decade, the following changes have been incorporated:

(a) 1941-1946 Improved control of mottled iron formation, providing clearer chill at tread and more impact resistant gray iron backing.
(b) 1947 More rigid inspection and standards for rotundity adopted for wheels shipped from AMCCW plants.
(c) 1945 AMCCW plants adopt limitation on chill depth in rim.
(d) 1945 Rim thickness increased.

greater ability to restrain and check vibration is beneficial from the standpoint of axle stresses and loose wheels. There are also indications that the use of chilled wheels is beneficial from the standpoint of cut journals and hot boxes.

Abrasion of rails from wheel contact is less with chilled wheels than with wheels of other metal.



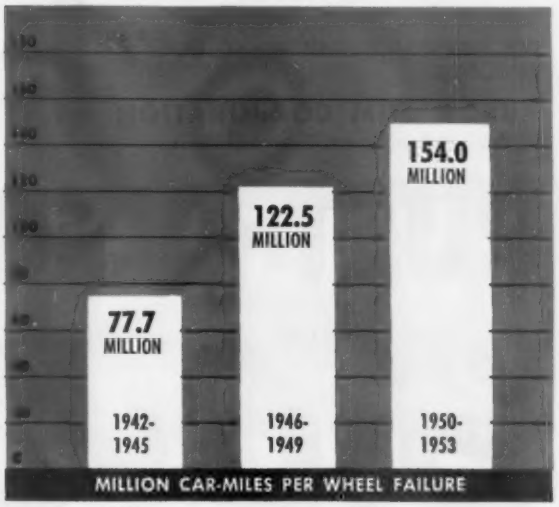
When the general inspector visits an AMCCW foundry, he not only checks the inspection methods but molding procedure, cupola, pouring, and annealing practices. It is also standard practice for him to check all gages in use by the resident inspector, as illustrated.

Improvement through research

The Association of Manufacturers of Chilled Car Wheels was founded in 1908 with the primary object of improving the chilled car wheel. Notable accomplishments include metallurgical and design improvements that have made possible better control of chill depth and chill and mottle formation in wheel treads, providing an appreciable increase in resistance to impact stresses and improving wheel safety to a point where it is at least equal to that of any other type of railroad wheel.

Improvement through inspection

The Association maintains a complete inspection service, operating through field inspectors stationed at each member plant. These inspectors follow every lot of wheels through the entire process of manufacturing and, following routine inspection, file complete reports at Association headquarters. The work of the resident inspectors is supervised by the Association's traveling general inspectors, who visit member plants at regular intervals.



Continuous improvement in the performance of chilled car wheels is shown in chart form for three four-year periods. The year 1953 alone was 50% better than any single year since records have been kept. When all derailments charged to wheels by the I.C.C. are taken into consideration, the AMCCW chilled car wheel has the best safety record of any type of wheel in freight car service.

Association of Manufacturers of Chilled Car Wheels

445 North Sacramento Blvd., Chicago 12, Illinois

Member Companies:

Albany Car Wheel Co.
ACF Industries, Inc.
Marshall Car Wheel & Foundry Co.
Southern Wheel Div. (American Brake Shoe Co.)
Griffin Wheel Co.
Pullman-Standard Car Mfg. Co.

This information was condensed from the 64-page booklet, "The Chilled Car Wheel," a copy of which will be sent on request.

1 ⅝" TRAVEL

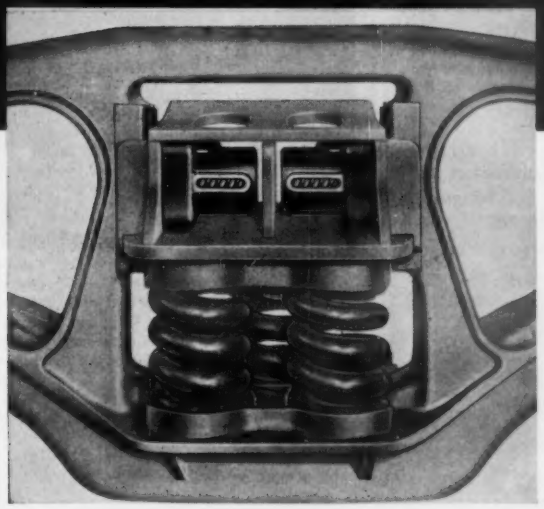
2 ½" TRAVEL

Easy Ride HOLLAND

VOLUTE SNUBBERS UNIT TYPE

Still The Favorite Low Cost Conventional Method For Eliminating Dangerous Harmonic "Bouncing" On Existing Equipment

HOLLAND RS-1 RIDE STABILIZER



HOLLAND RS-1 RIDE STABILIZER

A new high-efficiency device for use with long-travel coil springs.

The RS-1 Unit will convert your conventional freight trucks at moderate cost, into modern "high speed" trucks, with standard A.A.R. long travel springs.

Write for Bulletin No. 16A

HOLLAND COMPANY

332 South Michigan Ave. • Chicago 4, Illinois

Newer, more positive method of flange lubrication

INCREASES MILEAGE BETWEEN WHEEL TURNINGS up to 40%

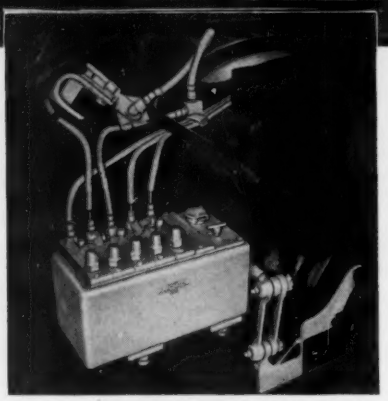
. . . reduces rail wear, too!

MAGNUS D-16 FLANGE LUBRICATOR

offers all these important features

- *Positive, controlled-pressure flange lubrication*
- *Six individually-adjustable pumps*
- *Also lubricates Center Pin Wear Plate*
- *Operates only when locomotive is moving*
- *No over-run on treads*
- *Sixteen pint capacity*

Recommended installation consists of one Magnus Type D-16 Flange Lubricator for each locomotive truck—using four outlets to lubricate all flanges and one outlet for center pin wear plate lubrication. With this arrangement, road locomotives can average over 1,000 miles and yard locomotives can operate six days without oil additions.



Close-up view of the above installation, showing D-16 Flange Lubricator mounted on truck frame, and connecting mechanical linkage to journal box. Flange head assembly and mounting bracket are visible at top left. Any movement of ¼" or more of truck frame with respect to wheels operates the ratchet drive of the lubricator and actuates all high pressure pumping units. Oil is delivered through copper tubing and flexible hose to Flange Head Assemblies—mounted at a 45° angle to wheel centers.

Equip your diesels with new Magnus Type D-16 Flange Lubricators and you extend mileage between wheel turnings up to 40%. Cut flanges of locomotives already in service smooth out quickly—in the first few hundred miles. Flanges of new locomotives stay smooth—won't cut or chafe. You save plenty on shop expense and "down time"—and you save on longer wheel life, too.

Each precision pump is individually adjustable with a single set screw. This means positive control of the amount of oil to each outlet point—makes it possible to provide maximum protection for flanges yet prevent oil from reaching the wheel treads. You also can deliver a smaller quantity of oil for positive center pin wear plate lubrication.

Write for complete information.

Magnus Brass
Manufacturing Company
Subsidiary of **NATIONAL LEAD COMPANY**
525 Reading Road, Cincinnati 2, Ohio

other Magnus Brass products for diesel locomotives

SAFETY VALVES for DIESEL STEAM GENERATORS

Easy accurate adjustment for opening and blow-down pressures. Prevent escape of steam into steam generator compartment.

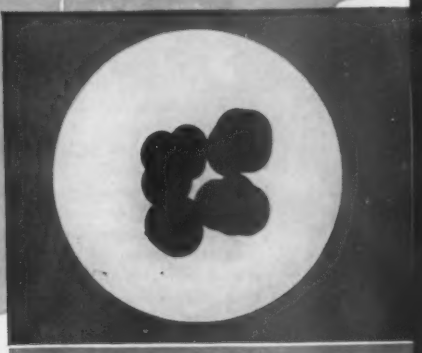
SIGHT GAGES for DIESEL FUEL TANKS

Flexible mounting to fit all standard diesel fuel tanks. Leak proof and practically indestructible.

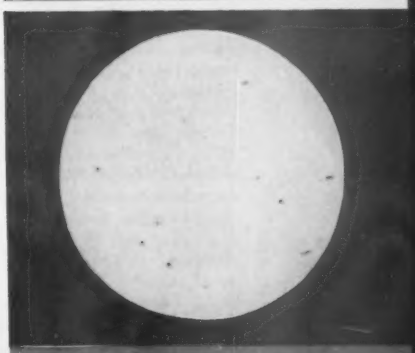
STABILIZATION · DISPERSION

FOR SUCCESSFUL USE OF LOWER COST DIESEL FUEL OILS

with Nalco SR-158D



UNTREATED lower-cost fuel oil sample, magnified 8400X, shows objectionable sludge particles that cause poor combustion, clogged filters and sticking injectors.



TREATED, same lower-cost fuel oil, same magnification as above, shows how Nalco SR-158D disperses sludge, reduces particle size.

- **CUTS FUEL COSTS**
- **IMPROVES FUEL EFFICIENCY**
- **LOWERS MAINTENANCE**
  - **of LOCOMOTIVES**
  - **of STORAGE and FUELING FACILITIES**

Nalco's series of Fuel Oil Treatments are enabling railroads to successfully use fuel oils that, untreated, would cause serious difficulties in both storage systems and locomotives.

Fuel oil cost savings achieved with Nalco Treatments are only part of the picture: better fuel combustion; sludge-free tanks, valves, pipes and injectors add further savings in maintenance and increase over-all operating efficiency.

Full details on Nalco Fuel Oil Treatments will be sent promptly upon request. Call your Nalco Representative, or write direct.

NATIONAL ALUMINATE CORPORATION

In Canada: Alchem Limited, Burlington, Ontario

THE Nalco® SYSTEM . Serving Railroads through Practical Applied Science

SUPPLY TRADE NOTES

(Continued from page 12)

the construction of a la.ge, modern plate glass producing plant at Cumberland, Md., at an estimated cost of about $34 million.

■

TEXAS COMPANY.—The Texas Company is establishing an independent Research and Technical Department and expanding its research facilities at its principal research laboratory at Beacon, N. Y. *F. H. Holmes*, former assistant general manager of the Refining Department, has been elected vice-president of the research and technical department. *M. Halpern*, vice-president in charge of the Refining Department, has been elected senior vice-president and will coordinate all research activities in the company, including those of the Texaco Development Corporation. *Dr. Wayne E. Kuhn*, manager of the Technical and Research Division, has been appointed general manager of the new Research and Technical Department.

■

INTERNATIONAL NICKEL COMPANY —Four new sections have been established in the Development and Research Division—Constructional Alloy Steels Section, with *H. V. Beasley* in charge; Electroplating Section, *Clarence H. Sample* in charge; Inco Nickel Alloys Development Section, *T. E. Kihlgren* in charge, and Stainless Steel and Heat-Resistant Alloys Section, *Dr. V. N. Krivobok* in charge. *W. Z. Friend* succeeds *F. L. LaQue* (now vice-president and manager of the Development and Research Division) as head of the Corrosion Engineering Section. *Dr. T. P. May* and *H. T. Paterson* have been appointed technical manager and operational manager, respectively, of the Kure Beach Corrosion Testing Station. *W. H. Sparr, Jr.*, succeeds Mr. Beasley as head of the Technical Field Section in Pittsburgh.

PITTSBURGH STEEL PRODUCTS COMPANY.—The *Brandon Equipment Company*, 332 South Michigan avenue, Chicago 4., will handle the marketing of ratchet and sectional bulkheads to railroads exclusively. The products will be sold as Brandon Pittsburgh bulkheads.

■

GARLOCK PACKING COMPANY.—*J. B. Sewell*, vice-president of the Garlock Packing Company of Canada, has been appointed general sales manager at Palmyra, N.Y., succeeding Louis Mohn, who is on sick leave.

■

REYNOLDS METALS COMPANY.—*Keith Hall* has been appointed manager of sales to the transportation industry, with headquarters in Louisville, Ky.

■

AMERICAN HOIST & DERRICK CO.—*Ray Dervey*, district sales manager at Pittsburgh, has been appointed general sales manager at St. Paul. He succeeds John E. Carroll, who was elected president.

■

DIXIE CUP COMPANY.—*T. D. Currie*, M.B.E., has been elected vice-president and general sales manager of Dixie Cup Company (Canada), Ltd., Brampton, Ont. *A. G. Malone*, recently Canadian sales manager, has been transferred to Easton, Pa., as national field sales manager for the eastern section of the United States.

■

SHERWIN - WILLIAMS COMPANY.—*Glenn A. Stetson* has been appointed transportation sales and service representative in the greater Chicago area. Mr. Stetson has been an assistant to general manager of the transportation sales division at Cleveland since November, 1950. In his new post, he succeeds *Harry M. Faber* who is retiring after 47 years of service with Sherwin-Williams.

The transport and petroleum section of the Oakite Company's new laboratories at 350 Hudson street, New York. The laboratories occupy 30,000 sq ft on a single floor and are subdivided into three major sections—product development, customer service and engineering. Each is set up with completely modern equipment to aid in the study of the removal of accumulations of dirt on various surfaces and the relation of different cleaners to this problem. Provision is made for the addition of a pilot plant for the small scale manufacture of detergents and solvents prior to field testing.

J. F. Clark

ACF INDUSTRIES, INC. — *James F. Clark*, vice-president in charge of finance, has been elected president, succeeding *Charles J. Hardy, Jr.*, who has been elected chairman of the board.

■

SYMINGTON-GOULD CORPORATION—*W. Fred Flickinger*, formerly with Baldwin-Lima-Hamilton Corporation, has been appointed as sales engineer, and *James M. Murdock* as service engineer, both with offices in New York. Mr. Murdock was formerly employed at Depew, N. Y.

■

BALDWIN - LIMA - HAMILTON CORPORATION.—*R. E. Nordstrom*, sales engineer for Baldwin testing equipment, has been transferred to Los Angeles. Mr. Nordstrom, formerly in the San Francisco office of the corporation, will report to *Paul E. LaFrance*, who was recently appointed manager of the Los Angeles office in charge of Eddystone Division sales.

■

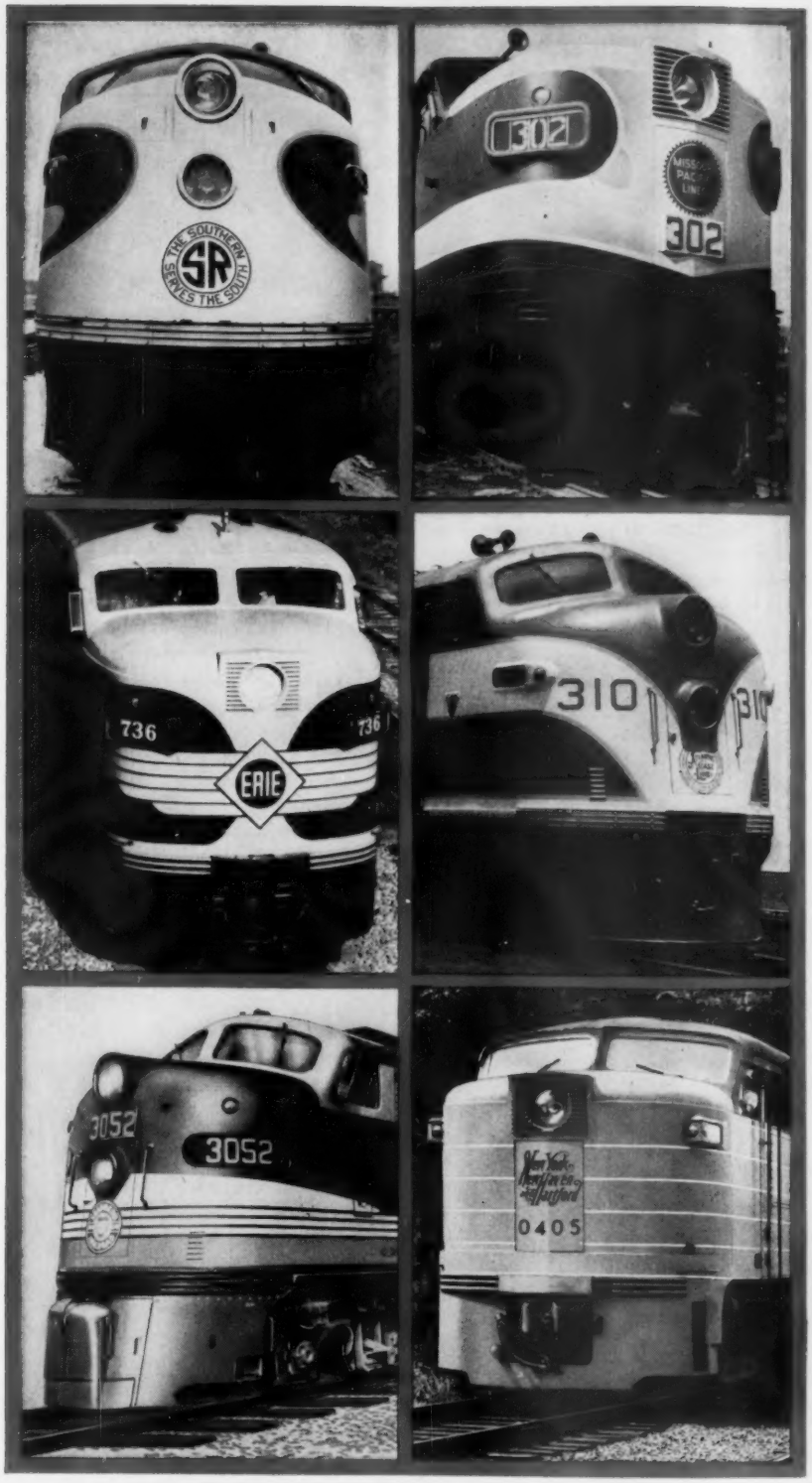
UNION CARBIDE & CARBON CORPORATION.—The *Oxweld Railroad Service Company* and the *Linde Air Products Company*, divisions of Union Carbide, have been combined. *K. I. Thompson*, formerly vice-president in charge of sales for Oxweld, has been appointed manager of the newly formed Railroad Department of Linde Air Products, with headquarters in New York. The former organization of personnel of Oxweld is now the Railroad Department of Linde. *G. P. Bogert*, president, and *M. Burnett, Jr.*, vice-president of Oxweld, continue in these capacities to assist in the transition.

Obituary

OWEN C. HECKART, sales representative of the Cardwell Westinghouse Company, died recently.

■

MAX EPSTEIN, founder of the General American Transportation Corporation and chairman of its executive committee, died at his home in Winnetka, Ill., August 22. Mr. Epstein founded the General American organization at the age of 23. The name of the company was changed to General American Tank Car Company in 1916 and subsequently to General American Transportation Company.



These and many others depend on Esso Railroad Products

High quality Esso Railroad fuels and lubricants are being used in more and more railroad diesels for smooth, powerful performance... long, trouble-free service.

Toughest tests ... on the road and in the lab insure that Esso Railroad Products meet and surpass the most rigid requirements set by the fast pace of modern railroading.

Continuous follow-up ... and on-the-job service by Esso Sales Engineers assure the top performance and dependability of the co uplete line of Esso Railroad fuels and lubricants.

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RAILROAD PRODUCTS

Like *All* Esso Railroad Products These Assure You Dependable Performance

Diesel Fuels
ESSO ANDOK Lubricants—versatile greases
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DIOL RD—Diesel lube oil
COBLAX—traction motor gear lube
VARSOL—Stoddard Solvent
SOLVESSO—Aromatic solvent
ESSO Weed Killer
ESSO Hot Box Compound
AROX—pneumatic tool lube
CYLESSO—valve oil
ESSO Journal box compound
Asphalt
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SOLD IN: Maine, N. H., Vt., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Md., D. C., Va., W. Va., N. C., S. C., Tenn., Ark., La.
ESSO STANDARD OIL COMPANY — Boston, Mass. — Pelham, N. Y. — Elizabeth, N. J. — Philadelphia, Pa.—Baltimore, Md.—Richmond, Va. — Charlotte, N. C. — Columbia, S. C. — Memphis, Tenn. — New Orleans, La.

Conventions and Release Dates

This issue is devoted to a presentation of an extensive digest of the reports and papers prepared for presentation at the cancelled meetings of the five Coordinated Mechanical Associations — the Air Brake Association, the Car Department Officers' Association, the Locomotive Maintenance Officers' Association, the Master Boiler Makers' Association, and the Railway Fuel and Traveling Engineers' Association. These meetings were scheduled for September 13 to 15.

All of these associations had excellent programs in preparation when their meetings were cancelled and they wisely carried them through to completion. Each plans to print its own papers in full in the customary year book for the benefit of its own members.

It has long been the custom of *Railway Locomotives and Cars* to print an extensive summary of the proceedings of the meetings of these organizations in an issue after the meetings. This, we believe, has rendered a useful service in addition to that performed by the associations' own year books. If that is true, then certainly the stress of present conditions on the railroad makes a continuance of that service desirable when these important groups of supervisors have been deprived of the benefits which always accrue from their meetings.

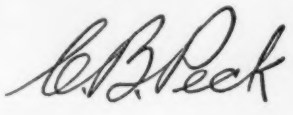
Perhaps we are presumptuous in assuming that we are "the other mechanical publication" referred to by a contemporary in its explanation of why it did not present a similar digest of the year's work of the five associations in its September issue. However, this seems to be a case where "the shoe fits" and we have no objection to wearing it.

In dealing with associations in our field, it has never been our purpose to achieve the status of official representative of any of them. We have tried to render a kind of service for the associations which their service to the field justifies. It is not a direct concern of ours whether or how other publications in the field choose to serve it in this respect. The question of *when*, however, is a different matter where meetings are involved.

In this case, of course, no meetings were held. But there was at least a tacit understanding that, in presenting the year's work of the five associations, the date of the meetings was a release date to be observed by all publications interested in conducting "conventions in print." This made the material available after September 15, not before, to any paper interested in printing it.

Railway Locomotives and Cars has no desire to deprive mechanical department officers and supervisors of access to information of value to them from any source whatever. But in situations where fairness calls for common release dates, it does not violate them and objects to their violation by others.

Quarrels are of no value to the field we serve and we do not seek them. There is constructive work enough to be done to keep all publications busy. We shall continue to devote ourselves to doing our share of it.



Class H-333 Draft Gear

Class A-22-XL
Friction Draft Gear

W. H. MINER, INC. · CHICAGO

the
Greatest
Protection
for a
Car
and its
Lading
.

This makes it OFFICIAL!

From June 1954 report of
A.A.R. Lubrication Committee

A check of Plypak applications to 4,650 70-ton cars since April, 1952, showed a ratio of 1 to 4.299 hot boxes, as compared with conventional packed boxes, or a reduction of 77 per cent in favor of the Plypak cars.

Reprinted from
Railway Locomotives and Cars
August 1954, Page 60.

Approved by A.A.R. and Protected in Interchange

77% FEWER HOT BOXES

when journals have PLYPAK protection

Be ready with PLYPAK when Shops reopen!

When cars are in the shop is an ideal time to apply Plypak for hot-box prevention. Better yet, apply Plypak *now!* With journals protected by Plypak, cars do not need to be shopped so often. Inquiries invited.

WAUGH EQUIPMENT COMPANY

New York · Chicago · St. Louis · Canadian Waugh Equipment Company, Montreal

The Meetings Were Held in Print

THE cancellation, early this year, of the Coordinated Mechanical Association meetings was a bit like closing the schools because of a heavy rainstorm—it gave the teachers a rest but denied the students two or three days of education that, like anything that wasn't done yesterday, is now a matter of history; it's just gone. So, once again the value of the printed word comes to the forefront, whether in books or in publications. It is still the most valuable medium for sending the lesson home to the student.

The value of meetings can be wrapped up in three counts: what a man can see or hear at a formal meeting; the opportunity to participate in a discussion that is too often necessary to clarify a problem and, lastly, the inestimable value of the opportunity to "visit" the other railroads in North America through meeting their representatives and being able to sit down and engage in a "sandhouse conference to get the real dope", whatever the problem may be. When there is an exhibit another full measure of opportunity offers itself; that of finding out, at first hand, the answers to a lot of questions concerning equipment and its use that a railroad man "just never has time to do much about when he is on the job and things are humming."

Each of the five associations completed their committee work and the results of a really fine job are set forth in the next 29 pages of this issue. The Fuel Association has a group of reports that cover the problems of locomotive and train operation and, for good measure, includes papers on safety and training. The LMOA again covered the details of mechanical and electrical servicing and maintenance with respect to locomotives and it, too, added a "human touch" with a committee report on training. The Boilermakers, which always can be counted on to produce topics of real interest and value, "took up where others left off" and dealt, in practical detail, with a group of subjects which, along with its continuing membership growth, stand as evidence of the adaptability of the association to today's problems.

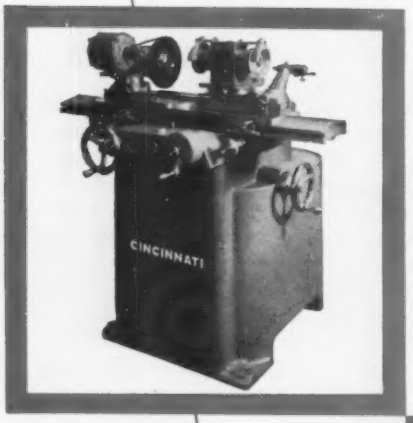
THIS year's activities of the Air Brake Association can perhaps best be measured alongside of last year's. One thing missing during a meetingless year is, of course, the thought provocation that has always been sparked by addresses from railroad officers outside the air-brake domain on subjects ranging from apprentice training to "how and why the air-brake man should become a better salesman." Maintaining continuity of effort can be exemplified by an idea of potentially far-reaching importance advanced during a discussion period last year. This idea proposed a separate air-brake craft with its own seniority list. The proposal aroused widespread interest and was discussed pro and con. Whether the idea is a good or a bad one is not of importance here. What is important is how to compensate for the stoppage of the ideas that would have flowed naturally from meetings and discussions and from the personal contacts between men of similar interest with similar problems.

AS usual, reports of the Car Officers' Association are replete with practical suggestions for more effective functioning of car equipment, both passenger and freight, in railway service. President Schey's statement shows how it has functioned more or less as a fact-finding body for the AAR and suggested detail improvements which, subsequently approved, have had a big aggregate effect. The report on AAR rules for interchange, billing and loading freight cars is outstanding. These rules as a whole constitute recognized good practice without which it would be impossible to interchange freight equipment efficiently from one road to another, bill for car repairs on an equitable basis, or load equipment for road movement with the safety and economy demanded by present competitive conditions. Numerous local groups of car men in different parts of the country suggest rule changes to the AAR periodically, but the CDOA is the only one which brings a national viewpoint to the consideration of these questions and its suggestions carry proportionately greater weight. The Wheel Shop report stresses a point when it said, "Too long, it has been taken for granted that most any kind of equipment is good enough for a wheel shop and in numerous shops antiquated machinery and facilities have been provided from left-over equipment taken from old machine shops. To benefit economically, modern equipment is vitally necessary.

One additional thought brought out in the report and well deserving of re-emphasis, is that railroads with more or less sub-standard wheel shops should definitely encourage their supervisors to visit modern shops and attend CDOA meetings which bring experienced wheel shop men together and enable them to get information needed to make recommendations for improvements.

IN conclusion, economy, due to business conditions, may have been a good and sufficient reason for "postponing" the 1954 convention and exhibit. The necessity for real economy in railroad operation may be just as great in 1955 and 1956 and the men in the mechanical and electrical departments, who collectively, have jurisdiction over the manner in which railroading's greatest expenditure—for maintenance of equipment—is made can't afford to go it blind. They need the education that the 1955 meetings can offer.

Operation Profit—
Maintained Easier with
Cutting Tools Ground on Cincinnatis



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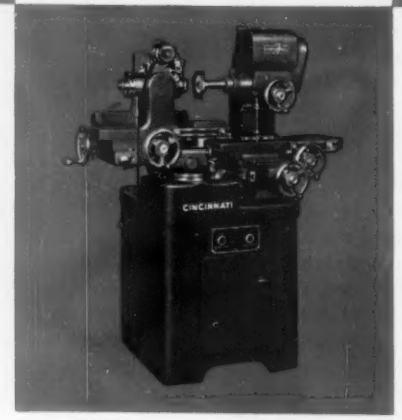
Cutter and Tool Grinder

Versatility and wide range, combined with accuracy and speed, give the No. 2 machines the highest endorsement for cutter maintenance in metalworking shops everywhere. The table rolls on balls between hardened ways . . . the grinding wheel spindle runs on anti-friction bearings contained in a cartridge . . . table ways and spindle unit replaceable at small expense. Swing over table, 10" diameter; maximum distance between centers, 27". Catalog No. M-1734.

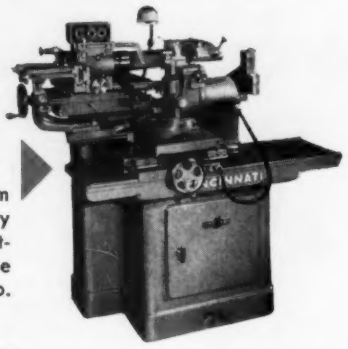
PROJECTO-FORM
Grinding Machine

For grinding small, accurate profile shapes on flat form cutters, lamination die parts and similar components. This machine combines grinding with an optical comparator unit. Master drawings made on Layout Scribing Machine. Catalog No. M-1612-4.



MONOSET
Cutter and Tool Grinder

For sharpening, repairing and making small cutters including countersinks, those required for die sinking, and other unusual shapes. Because of the universal construction, most jobs can be completed in one chucking. Catalog No. M-1591-2.



CONTOUR
Cutter Sharpening Machine

This machine grinds form milling cutters on the periphery of the teeth to a definite cutting clearance chosen for the work material. Catalog No. M-1552-1.

THE CINCINNATI MILLING MACHINE CO.
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MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

Car Men Deal With Today's Problems

Nine C.D.O.A. committees sum up developments in their field during the last year—Propose numerous AAR rule changes and more modern-equipped car wheel shops

CHANGES IN AAR interchange and loading rules as well as more modern car wheel shops were among the many improvements strongly urged in reports prepared by nine standing committees of the Car Department Officers' Association for 1953-54. There was general regret at the cancellation of plans for the annual meeting this year and a typical comment was that of the Wheel Committee which said in closing its report: "In conclusion, the committee goes on record as being opposed to the discontinuance of the regular C.D.O.A. meeting for the year 1954."

In the absence of an annual meeting, present officers of the association will hold over for another 12 months under the direction of President R. Schey, general superintendent car department, New York, Chicago & St. Louis, Cleveland, Ohio.

F. H. Stremmel
Sec.-Treas.

R. Schey
President

Construction, Repair and Upgrading of Freight Cars

This report covers principally the all-purpose car. We feel that field surveys should be started, the results of which, channelled through the A.A.R. and made available to all car designers, builders and carriers, will indicate what definite improvements and changes in car design are necessary to enable shippers to load and secure their lading more economically and at the same time permit easier unloading.

The usefulness of box cars with narrow doors, for example, and no devices for anchoring and compartmentizing loads is rapidly shrinking. Cars of any type, with old trucks are an operating handicap, expensive to maintain and a source of damage to lading. Their replacement with modern equipment will improve operating efficiency, reduce equipment maintenance, reduce the immense cost of freight damage claims and protect railroads against loss of business to competitors.

Railroads are endeavoring to give much faster service, which, though expensive, is necessary for shipper satisfaction; and the cost of which is somewhat overcome by their gross ton mileage and increased car handling and by the use of the modern diesels.

To maintain this coveted performance, equipment must be built and maintained to withstand these demands of progress. We know that when a new type of passenger car is built, credit system of travel inaugurated, or other progressive ideas presented, the public immediately is drawn to that convenience.

To meet some of the above requirements, we would suggest consideration be given to improvement of at least the following items:

Improved draft arrangement to meet modern requirements; more substantial inside lining; reduced corrosion by better design and improvements including use of non-corrosive metals or metal protectives at strategic points; wider doors to permit the more efficient use of loading and unloading trucks: a stronger or different type of floor which will not be damaged by loading trucks; Side wall devices to eliminate loads being anchored direct to lining; install automatic slack adjusters; better methods of vermin extinction; standardization of a ride control or similar truck; redesign present side sills, body bolsters, door posts and floor stringers, to withstand strain caused by present day methods of loading and concentrated methods of carrying loads

Maintenance—The penalty of neglect, or deferred maintenance, to the extent that shippers are not furnished cars suitable for their lading, is the one most important thing carriers must avoid, as this creates shipper dissatisfaction, which is the prime factor in diverting business from the rails to competitors.

It would be unsound, impractical, and uneconomical for railroads to attempt to maintain every all-purpose car of their ownership in the high physical condition car was when new. If this were done, cars suitable for flour, cereal, cans and other high class loading would require extensive floor, sheathing and lining replacement after every load of rough freight or contaminating commodity, to again restore the car to its former high condition.

The same is true of other classes of equipment.

The railroads must strive for and maintain shippers good will by furnishing the type of car suitable for the commodity to be loaded. This means, a car of the proper type, with no mechanical defects that would interfere with lading or cause delay enroute, and entirely free of debris.

The inspection, selection and preparation of freight cars to meet today's requirements and operation is of great importance insofar as the car department is concerned and requires the cooperation of all concerned.

When a car is shopped for repairs, all of the work necessary to keep it in service for the highest commodity practical, should be performed in the proper manner, to eliminate bad ordering the car after it is loaded and setting it out of a train en route, due to mechanical failures. The quality of work done rather than the quantity of output should be given first consideration.

One of the best ways of reducing the cost of maintenance and upgrading of equipment is to have available a skilled and well trained force.

Upgrading—It is conservatively estimated that the railroad industry is spending 100 million dollars a year cleaning cars. Loss and damage account for the year 1953 on all railroads was in excess of 111 million dollars, furthermore, we have no way of knowing the loss of revenue due to shipper refusing to load cars which were unsuitable or not the type for his requirements.

During the period between classified repairs, the upgrading of cars to maintain them in condition for first class loading has become a must, in view of the diversion of traffic away from the railroads, which to a certain extent is due to the class of equipment furnished shippers. Many of these cars are not suited for the commodity with which they are loaded due to shippers' commitments or because of the delay in furnishing more suitable cars.

The majority of steel box cars are water tight and many are suitable for upgrading by making moderately light repairs to floors, lining and doors. Also many of these cars carry wood floors that are, in the main, sound, but are rough and splintered and in some cases with only a few planks broken due to loading and unloading with mechanized equipment or concentrated loading.

An upgrading program on all so-called light repair tracks will do much to main-

President Schey's Message to the CDOA

The Car Department Officers' Association serves a useful function as an advisory body to the Association of American Railroads and makes recommendations to the AAR. C.D.O.A. committees also spend a great deal of time studying new developments in tools, machinery, etc., as well as improved or new practices which may come to their attention throughout the year. This phase of the committee work makes considerable, valuable, and useful information available to the membership of the association which can be put to use in car shops and yards all over the country. In fact the association yearbooks constitute a reference library of great value on all car matters.

Active committees for the present year are reporting on: AAR loading rules; wheel shop practices; lubrication; interchange and billing for car repairs; light repair track and train yard operations; construction, maintenance and up-grading of freight car equipment; maintenance of passenger car equipment; air-conditioning equipment; painting. These reports cover not only information pertaining to railroads in the United States but Canada, Mexico, and other countries as well.

Recognition has been given to the important work of the C.D.O.A. not only in the proper maintenance of equipment, but for the fine contributions made in design of equipment to reduce maintenance and eliminate troublesome bad orders, particularly when cars are under load. The many special types of equipment put in service in recent years require special knowledge and skill in order that the cars will be properly maintained and will be serviceable for a greater percentage of time.

Supply Industry's Contribution

The supply industry is to be commended for their help in developing products for freight cars which reduce the out-of-service time of equipment. For example, I might mention metal running boards which have eliminated not only a safety hazard to trainmen and others, but also have reduced to a bare minimum the number of cars bad ordered for these defects. In the good old days, the decayed and broken running board was a common defect and stopped many a load from going to its destination on time.

Trucks have also been improved to a point where they are now almost trouble-free. Brake beams down were common defects many years ago, and this defect is practically unheard of now. Wheels have been improved to the point that they give longer mileage and require less frequent changes. Technical improvements have been made in lubricating methods, and while we are still troubled with hot boxes, we are making progress, and with the new products now under test, can look forward to someday minimizing this defect to the same extent that many other common defects have been brought under control by the use of improved products and better engineering.

Management is cognizant of the importance of the car department and we know of many fine new repair tracks which have been constructed with such modern improvements as concrete roadways, mobile tractors, and machinery for handling heavy materials, all of which reduces the amount of labor to be performed and expedites repairs to equipment on loaded cars as well as empty cars. With a per diem rate of $2.40, it is, of course, important that empty cars as well as loads be repaired promptly, not only so that cars can be loaded promptly and earn more money, but to avoid per diem payments due to bad orders held unnecessarily. Car department men fully recognize their responsibility to the shippers and will continue to strive for better freight car equipment and better freight car maintenance, in order that delays will be held to an absolute minimum and customers satisfied.

tain cars for first class loading, even though the percentage is small in comparison to the total output of each repair track.

Upgrading should consist of cleaning and, if necessary, washing cars, repairing floors and lining, straightening ends, repairing doors and maintaining trucks in good condition.

Somewhat less than 20 per cent of the empty cars available for commodity carding are fit for A or first class loading without some upgrading. It is evident that comparatively good cars are being classified for a lower commodity because of the fact that upgrading is not a universal practice and cars must be carded for the commodity for which they are fit at the time of inspection.

All efforts in upgrading cars will be of no avail, however, unless those concerned cooperate fully in handling and placing cars as commodity carded.

Railroad service and earnings depend on a united effort to recognize shippers' requirements as well as striving for improved cars to withstand the present methods of loading and car handling.

The report was prepared by a committee under the direction of A. J. Larrick, regional master car builder, B&O, Cincinnati, Ohio.

Wheel Shop Practices

Many railroads are attempting to provide wheel shops with modern high speed machines having sufficient power to permit the use of carbide tooling. Also the necessary handling equipment such as conveyors, racks, etc.

Cleaning Axles for Testing— Many methods of cleaning axles are employed by the various railroads at present, such as rotary brushing of axles (by hand), sand blasting, flame cleaning, shot blasting, knurling, etc. The committee feels that if the idea of Magnafluxing axles between wheel seats is to remain mandatory a rule should be included in the Wheel & Axle Manual whereby specific methods should be designated to do this job both satisfactorily and economically.

The committee noted that few axle failures occur between the wheel seats and it is their opinion that consideration should be given to revising Rule 355-0, Page 211 in the Wheel and Axle Manual to restrict the cleaning of car axles to wheel seats and journals only, except when the portion between wheel seats has been machined.

The committee recommended that consideration be given to including a rule in the manual governing the Magnaglo paste concentration in a new bath. It is recommended that the paste concentration be limited to 3 to 4 cc in a new bath and a final limit for bath contamination to be 6 cc, the bath to be checked each week and changed with any presence or sign of fluorescence. Inasmuch as most Magnaglo machines are being operated as received from the manufacturer, i.e., equipped with a small canopy or hood over the black light which allows outside light to reduce fluorescence and easy crack detection, the committee suggests a mandatory rule be included in the manual to have these machines operated in complete darkness.

It was also recommended that a test axel or shaft known to have circumferential cracks be put through the machine at the start of each shift to determine if the machine is functioning properly.

Maintenance of Roller Bearing Wheels —The ever-growing demand for roller bearing wheels on railroads throughout the country in both passenger and freight service creates an increasing responsibility of the wheel shop supervisors.

Suggested Addition to Sec. 21 of Wheel and Axle Manual

1—Check dismounted roller bearing axles between centers with indicators and micrometers for journal distortion.

2—Check for maximum allowable run out to be designated by AAR at the center of the axle and at the 1½ in. radius on journals after wheel seats have been turned.

3—Prohibit the practice of welding wear plates on the sides of roller bearing housings that can be removed from bearings; this to eliminate as much as possible the flash-over that might occur if the housing with rollers enclosed is not properly grounded.

4—It is suggested that roller bearing housings be submerged in water while being welded to prevent distortion.

5—All roller bearing axle end caps must be re-applied; torque wrench to be used on the bolts.

Maintaining 3-In. Radius

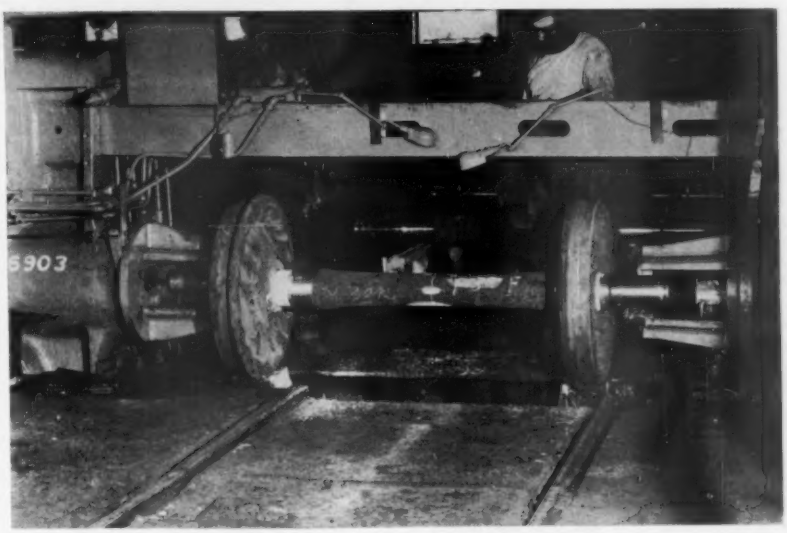
Proposed Form—Eliminate all reference to dimension *L* (W. & A. Manual, p. 20, Fig. 9,) and consider dimension L the same as any other dimension to be maintained when machining new passenger car axles only.

Reason: Many wheel shops are not equipped with a lathe having a profile attachment, without which the machining of the 3-in. radius is difficult. Also, if the 3-in. radius is remachined on a second-hand axle to mantain dimension *L* when the axle has a run out at center of axle will leave a depression in the body of the axle where the 3-in. radius blends with the center part of the axle and this depression could be a contributing factor to a broken axle. The rule change contention is upheld by the fact that the majority of second-hand passenger axles in service today have been remachined on the wheel fits and dimension *L* has not been maintained.

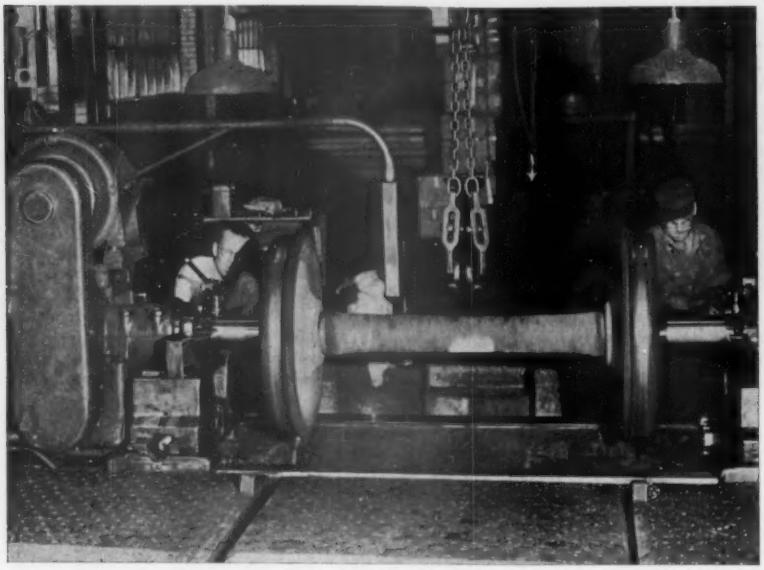
Coating of Journals

Proposed Form—Par. 363-E, Sec. 20, ADD-Journals of mounted defective wheels and/or axles in storage for movement to wheel shop need not be coated unless axle dimensions for AAR billing repair purposes are obtained from the wheel shop.

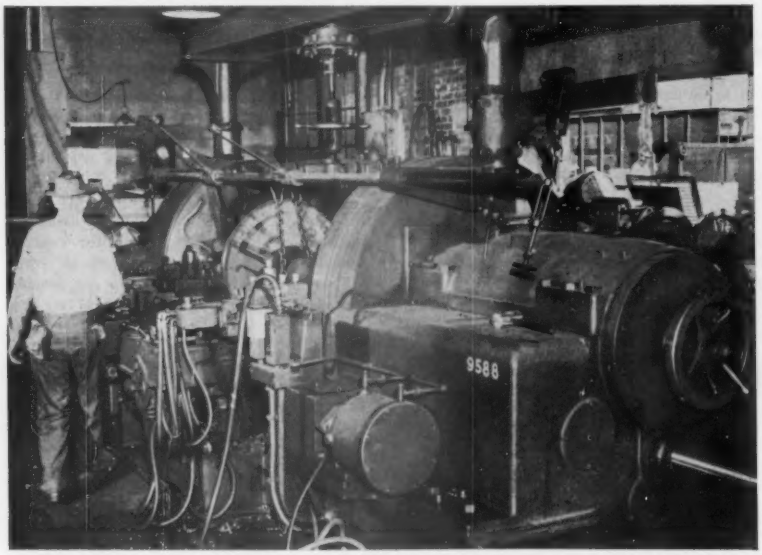
Reason—There is considerable disagreement regarding the necessity for coating journals that are moving to wheel shops for reconditioning. The reason for coating journals, of course, is to prevent rusting



Oilgear pump (right), recently applied to an old hydraulic press at L&N wheel shop, South Louisville, Ky., increased production of mounted wheels approximately 20 per cent as compared to the old style vertical hydrostatic water pump. New pump also makes a smoother movement of the ram and produces a much better chart.

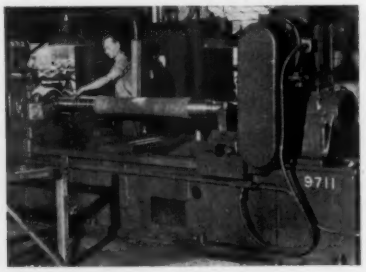


Mounted journals being turned on a Sellers end-drive axle lathe at a speed of 200 rpm and feed of .016 in. per rev. Journals on 18 to 20 pairs of wheels a day are turned and rolled. Normally, one man operates this machine.



Niles 54-in. wheel lathe at South Louisville shops. With hydraulic tracer controls, this machine utilizes a single point carbide-tipped tool and operates at a speed of 115 surface ft per min and feed of .046 in. per rev. From 9 to 14 pairs of steel wheels are turned per eight-hour shift, depnding on the size and class of wheels.

Niles 48-in. hydraulic boring machine for diesel wheels which uses carbide tools and is operated at a speed of about 300 surface ft per min or 125 rpm on bore, and a feed of .020 in. per rev. on the roughing cut.—Feed can be increased on the finish cut to give the desired finish; output, about 8 wheels a day boring and finishing the hubs. (Wheel seats on both EMD and Alco locomotive axles are found so accurate that wheels can be finish bored to standard size).



Sellers end-drive axle lath used at South Louisville shops to turn and burnish demounted axle journals. Burnishing is done on this machine only in emergency or when the regular burnishing machine is down. Journals are turned at a speed of 200 rpm with feed of .016 in. per rev. Output, 16 to 18 axles per eight-hour shift.

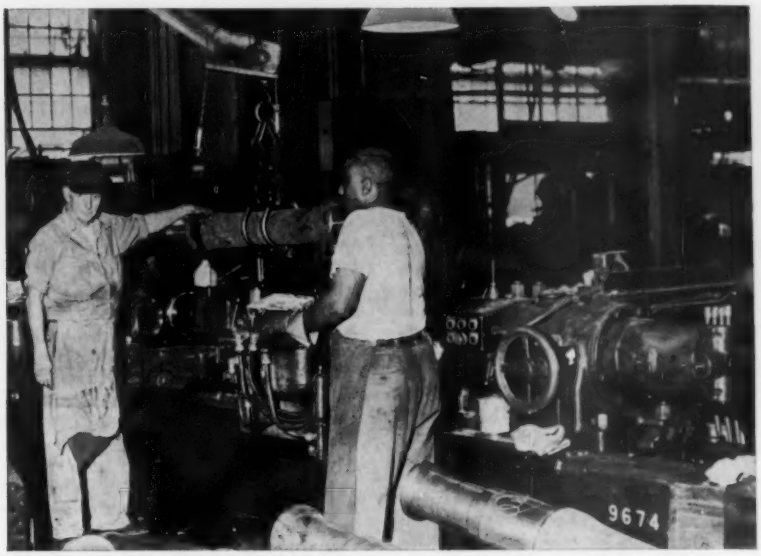
and pitting of the journals and possibly reduce the amount of metal turned off journals when undergoing reconditioning. Unless journal dimensions for AAR billing purposes are obtained after turning, the committee believes that the AAR ruling with regard to coating of journals should not be a mandatory requirement and that each company be permitted to use their own discretion. This question has arisen due to the expense of coating journals on wheels coming to the wheel shop for journal turning, a further expense being involved in cleaning the coating from the journal prior to turning. In case of a number of the preventatives, the removal is quite difficult and it is the committee's contention that little if any more metal would be removed from the journal if the journals were not coated as presently required.

Checking and Care of Gages

Pressure Gage Test Date—Page 211, Par. 356-B refers to gages having to be tested every six months at which time the test date is applied. It is quite common to have gages returned or applied in service several months after test date, and as the interpretation of this rule does not allow for the time the gage is not in service we are requesting that the rule be changed to permit a full six months service limit. The gage, when placed in service, should be tagged by a supervisor and show the date of application to the press.

Car Wheel Borer Check Wheel—The manual, Page 113, Par. 135 shows just how boring mill jaws are to be checked for irregularities but no detail is given as to the diameter of wheels to be used. We are requesting specification in the manual of the size of check wheel or wheels which should be used.

Testing Burned Journals—To be on the safe side, we recommend that when any journal is burned to the extent of having bronze penetration the axle be scrapped, bearing in mind that the Magnaflux method will not detect bronze inclusions. Those



Niles end-drive hydraulic axle-journal-burnishing machine installed at South Louisville shops. This machine is hydraulically equipped as to carriage and centers and has opposed burnishing rolls. Output, 70 to 80 axles per 8-hr day.

Niles car-wheel boring machine, which uses carbide tools both to rough and finish-bore steel and cast-iron wheels. Speed for cast iron wheels, 95 rpm; rough feed 1/16 in. per rev.; finish feed, 3/16 in. per rev. Speed for steel wheels, 75 rpm; rough feed 1/16 in. per rev.; finish feed, 3/32 in per rev. The possible output is one cast iron wheel, floor to floor, in 3 min., but constant output will not show that much. Steel wheels run a little over 50 per cent of the output of cast iron.

shops with Magnaglo equipment should be permitted to test cut or burned journals and restore the axles to service after reconditioning and a satisfactory Magnaglo test.

Welding Journal End Collars—Par. 352, Page 207, permits the welding of end collars. It is the committee's contention that more labor can be spent building up and machining the collars than is desirable, especially so, as it is felt that in practically all cases either the limit of diameter or length of journal will occur long before the collar reaches the condemning limit for thickness, and it is recommended that this part of the rule permitting the welding of collars be eliminated.

Concentric Wheel Turning—Par. 357, Page 214, specifies that wheels must be, after turning, truly concentric and true to plane. This is a practical impossibility as few lathes are in existence that will accomplish this result. The committee suggests that a tolerance of approximately .020 in. to .030 in. eccentricity full dial reading and .020-in. full dial plane reading be allowed. Even this result will be difficult to accomplish.

Car Wheel Borers—Par. 354-C, Page 208 outlines the amount of eccentricity and plane run out that is permissible. It is the suggestion of the committee that the tolerances which are specified in the rule be changed from .015-in. plane to .015 in. full dial reading and .004 in. concentric to .008 in. full dial reading as it is felt that the average boring mill can be held to that tolerance.

Micrometers for Axle Lathes—Par. 355-D, Page 209, makes reference to the measuring of wheel seats by micrometers. This rule is interpreted as a requirement to have micrometers available at the axle lathes. It is general practice to measure all wheel seats, not always at the lathes, but frequently on a rack or convenient location adjacent to boring mills, the measuring being accomplished by the boring mill operator. If the use of the micrometer is not required by the lathe operator then it should not be necessary to have micrometers at the lathe. It is suggested by the committee that this rule be reviewed and if, in view of our suggestion, micrometers are required at the lathe, it should be definitely specified in the appropriate rule in the Manual.

Diesel wheels, finish bored and machined on the hubs at South Louisville shops. Skids save time and labor in handling wheels to and from the Niles boring mill.

Tapered Journals—Par. 194 and Par. 204, Pages 143 and 144, specify varied journal tapers, one at .005 in. and the other 1/32 in. The committee feels that wheels are never removed from service for a tapered journal but for other defects which shop the wheels and when in the shop the journals are subsequently reconditioned. The committee feels that the 1/32-in. tapered journal is confusing to wheel shop supervisors and suggests that the items above be shown to read—Journals turned must not be in excess of .005-in. taper. Wheels removed from one car and applied to another when journals are not reconditioned must not have a tapered condition of the journal in excess of 1/32 in.

The report was prepared by a committee headed by Chairman W. D. Nelson, shop superintendent, L&N, South Louisville, Ky.

Light Repair Tracks And Train Yard Operation

Due to increased competition in the transportation field, railroads are finding it necessary to work out ways and means to reduce delays on account of bad-order equipment, thus keeping loaded cars on schedule, cutting down per diem and increasing revenue car miles. To accomplish this feature, railroad managements are urged to authorize improvements and proper facilities for both the general light-repair tracks and emergency yard-repair tracks.

When considering the changing of present general light repair tracks or planned installation of new facilities, operating and mechanical departments should cooperate in the selection of proper location which should be adjacent to classification yards

and connected with switching leads on both ends to facilitate switching. By so doing, switching costs are reduced and delays minimized . . .

It seems apparent that empty cars on light repair tracks are not receiving attention to parts such as box car doors, flooring and lining, also lack of maintenance of drop end gates on gondola cars. Their condition generally is bad and reflects lack of adequate attention and maintenance.

In some large terminals it has been found desirable to install an emergency light repair track which speeds up the handling of bad order rush or perishable loads considerably. Two or more such tracks properly located in a yard are more efficient than one long track if the volume of work is sufficient. By having more than one track, even if they are short, many man hours are saved, as the foreman can work one track out at a time, then while it is being switched and refilled, the men will be working one one of the other tracks.

It is also practical in some large terminals to work at least small gangs around the clock seven days a week. This also reduces delay to rush or perishable loads and keeps this class of bad orders at a minimum.

Cooperation between operating and car department in ordering trains will give ample time for outbound inspection, repairs, servicing journal boxes and air brake tests; also ample time for inbound inspection, proper classification of bad orders, commodity carding of empty equipment and necessary running repairs.

On outbound inspection, proper servicing of journal boxes, with brake test to include repairs to train lines and fittings and adjusting of piston travel will minimize train delays due to mechanical failures. Some roads have lengthened the distance between service points, eliminating intermediate service points by allowing sufficient time to perform this class of work at initial terminals having adequate facilities.

Some consideration should be given to the better training of employees working as car inspectors and oilers. With the advent of the 40-hour week which eliminated train yard overtime, the older and more experienced carmen have exercised seniority to work on repair tracks, leaving younger inexperienced employees in train yards.

The report was prepared by a 10-man committee under the direction of Chairman C. E. Dyer, terminal supervisor of car maintenance, C&NW, Chicago.

Car Repair Interchange and Billing

During the past year the committee considered proposed revision of and additions to the present Code of AAR Interchange Rules, and we submit the following recommendations for your consideration:

Rule 4—Recommend additional note to Sec. (f), Par. 3 stating that alternate standard tie down anchors or approved equivalent are listed under Rule 101.

Reason: To indicate approved types of lading tie-down anchors.

Rule 9—Recommend that last sentence under Sec. "General" be eliminated, namely, (*The above information to be shown opposite each item, except where no bill is rendered.*)

Reason: As now written, the inference is that if a pair of wheels are removed account cut journal or slid flat wheels it would not be necessary to show if car was or was not equipped with packing retainer devices. It is considered just as important to show if car was or was not equipped with packing retainer devices when wheels are removed, or other work performed, account handling line responsibility as it is to show this information when repairs are made account owner's responsibility.

Rule 9—Recommend that section under caption "Journal box lids, applied" be changed to eliminate: *Kind (P.S., M.I. or Composite)*. Rule 101 item number and size. *When "AAR-1947" or subsequent approved lid is applied. Type designation must be shown to justify charge.*

Reason: To eliminate unnecessary wording on billing repair card.

Rule 16—Recommend that fourth paragraph be modified by adding: *When new standards are applied at any location car must be stencilled indicating the location at which applied, for which a charge of ½ hour labor may be made. This stencilling to be shown underneath the new standard stencilling.*

Reason: New standards are being removed and old standards substituted which are also subsequently removed by another road and defect card not found on car resulting in either improper repairs or subsequent betterment charge to the car owner.

Rule 17—Recommend that third paragraph of Note 3, Sec. (e) be modified to eliminate requirement for 25 per cent credit and substitute scrap credit.

Reason: Opportunity for re-use of these items has reached the vanishing point and it is unfair that repairing lines must allow 25 per cent credit for an item which is of no further use.

Rule 25—Recommend that this rule be modified to require holding defective side frames *cast subsequent to 1926* and promptly reporting them to car owner for inspection and disposition, which must be furnished within 30 days.

Reason: To partially harmonize with Inter. (M-12) Rule 17 and (because) truck sides cast 1926 or prior have outlived their strength and are dangerous in high-speed freight trains.

Rule 33—Recommend that Par. (b) (3) be eliminated and Inter. (2) and (3) be modified to make tank car owners responsible for repairs to safety appliance defects the same as any other car owner.

Rule 33—Recommend that the answer to Inter. (2) be modified to include specifically metal as well as wood running boards and brake steps.

Reason: To clarify the intent.

Rule 60—Recommend that Sec. (i) be modified to increase the period since last brake cleaning from 60 to 90 days.

Reason: The guarantee period for air brake cleaning shall be increased to a more equitable time because all cars are carrying improved types of air brake equipment and repairing roads shall be required to guarantee their work for a period consistent with the improved type of brakes.

Rule 66—Recommend that Par. (g) (2) be eliminated and Par. (g) (3) be renumbered and modified to specify that if the repacking date is *less than 14 months* old, the stencilling as required under Sec. (c) *must* be changed, for which one-half hour labor may be charged.

Reason: Present paragraph (g) (2) places unfair penalty on repairing road; furthermore, tests have indicated that the longer journal boxes can be operated without disturbance, the less opportunity there is for journal overheating.

Rule 66—Recommend that note be added to Par. (j) Item 7 as follows: *Note— Defects as indicated above may be shown on billing repair card by item number.*

Reason: To permit an item number to be used to describe reason for making the repairs.

Rule 70—Recommend that note be added to Sec. (a) as follows: *Note—When car is stencilled for type of wheels then railroad perpetuating improper repairs must* stencilling on car regardless of the type of *wheels removed.*

Reason: Cast-iron wheels can be removed numerous times before car is received home by owner and the original road making the improper repairs is refusing to accept responsibility in view of wheels removed at the time of correction not being the same wheels applied by them upon the original wrong repairs. Repairs should be made according to the stencilling on car regradless of the type of wheels removed.

Rule 70—Recommend that Inter. (1) be modified to eliminate the last sentence: *However, if charge for M.W. wrot-steel wheels applied is in excess of new cast-iron wheels and car owner claims cast-iron wheels are standard to car, such claim must be supported by joint evidence.*

Reason: There should be no necessity of obtaining joint evidence when billing repair card clearly indicates that cast-iron wheels are standard to car.

Rule 101—Recommend that Item 104-C

be modified and a suitable charge established for the 12-in. size pressed steel box lid.

Reason: To conform with list of AAR approved types of journal box lids in Rule 101 which shows under lids for 6½ by 12 journal boxes "104-C Union Spring and Manufacturing Company Type Designation 289."

Rule 101—Recommend that new Item 182-A be added to show permissible charge for a Creco-type bottom rod guard.

Reason: To provide a uniform charge for item no longer protected by patent and charged variously as 3 lb forging or elliptical spring. Present purchase price is $.88; therefore, it is inequitable to charge at forging price. Correct price to be established.

PC Rule 7—Recommend Note 2 following Par. (f) (13) be modified to make the charge for untreated 36-in multiple-wear wrought-steel wheels substituted in place of heat treated wheels *on basis of material applied and removed* instead of scrap value.

Reason: The penalty is too heavy in view of the small difference in value of heat treated and untreated wheels and small proportion of roads that use this material. It places a burden on railroads requiring that they maintain stocks of heat treated wheels to avoid penalty.

PC Rule 7—Recommend the following note be added after Par. (1) (2): *Note—Cars with journal roller bearings having both grease and oil lubrication will be due for periodic attention at the expiration of the 30 day period.*

Reason: To provide date due for cars having mixed lubricating types of journal bearings.

The report was prepared under the direction of Chairman C. W. Kimball, supervisor of car inspection, Southern, Washington, D. C.

Improvements in Paints and Cleaners

Present day metals used in construction of railroad equipment make it important to consider carefully, surface preparation, especially critical areas such as concealed surfaces. One of the greater sources of trouble is the corrosion of siding, the critical area being the girder sheeting. Some of this sheeting has rusted beyond repair and it is necessary to remove and replace it, a costly operation which we feel could be eliminated by proper design in the building of this equipment.

SUGGESTED IMPROVEMENTS

(a) Snap-on moulding or some material that will be weather sealing, particularly in cars having fluted siding. Snap-on mouldings having a slight pitch to the top side.
(b) Special drip moulding or a small overhanging roof edge to prevent dirty water draining over the car sides and windows.
(c) Some means for draining water accumulated back of side sheeting and ventilating this space.
(d) Improved method of installing car windows, eliminating rubber extensions cemented to metal window opening.
(e) More liberal use of plastics and stainless steel for protection of car interiors, for areas receiving considerable abuse, such as door casings, grill frames, hallway wainscot, bulkhead partition casings, basket rack nosings, wider door kick plates and cove mouldings.
(f) Elimination of natural dirt-catching corners, particularly the piping behind closet bowls.

Greater effort is indicated in the simplification of metal types with a conscientious effort to eliminate wherever possible the use of multiple metals which give source to corrosion difficulties in the presence of moisture, and more particularly in the presence of acids and/or salts by electrolysis. Since most of the cleaning compounds fall into one of these classifications, present day car construction, with fancy metals, has resulted in corrosion difficulties not formerly experienced.

It has been thought that modern methods of cleaning have been mostly to blame for these new difficulties due to chemical types of cleaning of compounds, high pressure, atomization, etc., but it should also be remembered that in earlier days, car construction was, for the most part, single metal construction, or nearly so, and did not offer the opportunities for corrosion by electrolysis.

CAR STENCILS-REFLECTIVE SHEETING

The introduction of ready-cut pressure-sensitive stencils for the spray application of lettering and car numbers on equipment has been an outstanding contribution, not only for the ease with which they can be applied, but savings in labor and material.

When lettering and car numbers are applied to cars using this method, the lettering is depressed making it ideal for use in car washing machines. The lettering is sharp and uniform in appearance having no rough edges or brush marks. We recommend the use of depressed lettering and numbers to be used, by pre-cut stencils, also that this be included in specifications to the car builders.

Reflective sheeting is used to reflectorize a wide variety of signs, guard rails, passenger cars, box cars, diesels, etc. Company trade-marks, and other color schemes are easily executed in the brilliant reflective sheeting colors. A combination of reflectorized emblems and attractive striping brightens railroads rolling stock, alerts the motorist and tells a story, day and night, in addition to its value from an advertising point of view.

Application of Reflective-Type Pressure-Sensitive Sheeting which Does not Require Activator.

(1) Remove protective paper backing.
(2) Sharply bend edge toward front face side with a flick of the thumb. A small sharp bend at a corner will cause paper backing to break away from the reflective material. Paper backing may then be easily removed.
(3) Press end in position and apply to surface, press firmly to surface with a plastic scraper. Be sure all edges are firmly adhered.
(4) Seal edges with finishing clear. Sealing is easily done either by hand brushing, spraying with the 12 ounce spray can that contains clear, or by using a homemade device constructed from a pistol type oil can.

The report was prepared under the direction of Chairman R. Fisher, foreman painter, Cleveland, Cincinnati, Chicago & St. Louis, Beech Grove, Ind.

Passenger Car Maintenance

[The committee urged preventive maintenance vs. repairs after failures; emphasis on increase efficiency and cost control; job instruction, systematic search for new ideas and better materials.—Editor]

Many economies are possible by the careful selection of materials, either in the original application, or when making repairs. We are much encouraged by the development of the new plastics, and their application to woven sheet and tube sizes and shapes has outlined and opened up a promising future. This future has to do with passenger appeal as well as maintenance saving. Plastic materials have been extended to use as floor coverings, head rests and slip covers, interior signs, and light shades, and in all of these applications the colors and designs have produced startling combinations, causing much favorable comment from the public. A new development in glass fibre is being used for window curtains and the evidence so far shows that we can expect longer wear.

The problem before the car department officers of the country is to maintain passenger cars on the most economical basis

possible. It is the desire of this committee to produce thoughts and ideas to stimulate concerted thinking regarding future economies along the lines of equipment, methods and materials. In last year's paper we outlined programs for yard attention, for annual air-conditioning work and class repairs and we feel much can be gained by referring to last year's paper for details, procedures and practices to be followed.

It is encouraging to note the low cost for maintenance of trucks on new passenger cars built within the past 3 or 4 years. Car builders are giving much attention to truck design for low cost-maintenance on all of the latest passenger cars. Some of these cars, now three and four years old and with high mileage, require little truck repair work other than spring renewals. It is almost unheard for shoe keys to be missing, or cotter keys lost and this must be credited to the fine spring arrangement that reduces the vibration on the truck as well as the car body. Pedestal liner wear and journal box wear has noticeably decreased.

The report was prepared by a committee under the direction of Chairman J. F. Swafford, assistant master mechanic, Washington Terminal Company, Washington, D.C.

Changes in AAR Loading Rules

At a meeting held in Chicago March 2, 1954, it was agreed to submit for consideration the following recommended changes in the AAR rules governing the loading of commodities on open-top cars.

Item 1—Recommend the revision of Fig. 13, Pamphlet MD-1, covering the securement of rails on flat or gondola cars to omit the first paragraph on page 84, which reads: "Items D, E, F, and G may be substituted with three 2-in. by .050-in. high-tension bands encircling load. Locate one band about 7 ft. from each end of load and the third one midway between the other two."

Reason: Have observed many failures of high tension bands, indicating they are not an adequate substitute for the other specified method of securement. Also high-tension bands are being used quite extensively by all shippers because this method of securement is not as costly as the use of Items D, E, F, and G.

Items 2—Recommend that Fig. 26 of Pamphlet MD-1 governing the loading of large girders, structural metal shapes, plates, etc. over-hanging one end of car, flat or gondola cars, be revised to omit the next to last paragraph on page 123, which reads: "Items C, D, E, and H not required at closed end of gondola car when substituted with 2-in. by .050-in. high-tension bands, located as close together as possible, with sharp corners protected, and side blocking used when the side clearance exceeds 8 in."

Reason: Experience has shown that tie bands and side blocking frequently fail in ordinary switching, allowing the load to spread against car walls resulting in unequal distribution of weight.

Item 3—Recommend that Item B as shown in Fig. 33, 34 and 35, Pamphlet MD-1, be increased in size from 4-in. by 4-in. to a minimum of 6-in. by 6-in. or that consideration be given to use blocking equal in height to ⅓th the diameter of the rolls, but not more than 10-in. high, as required by illustration 18 in Pamphlet 23 covering the method of loading the same commodity in closed cars.

Reason: Have observed several cases where the lading rolled over the side blocking, but in most instances this was confined to lading in excess of 48 in. in diameter.

Item 4—Recommend that Fig. 7 of Pamphlet MD-5 covering the securement of boiler sheels, tanks, or sections, 8 ft. long or over, loaded lengthwise, one or more per car, flat or gondola cars, be revised to omit the use of item K which is a permissible substitute for bolts as per item L.

Reason: Item K does not in any way secure head block item G to car floor, consequently, with a slight shift of lading and lateral motion of car, item G becomes loose and dislodged.

Item 5—The committee was advised that a large shipper offered 140 car loads of marine buoys to two railroads, provided they would handle them without the required securement of items E and H, per Fig. 19, Pamphlet MD-7. The two railroads involved accepted shipments without the securement of items E and H by mutual agreement, and prior to March 2, 1954, were accepted and moved to destination without mishap. Inspection at destination disclosed that lading was not damaged or disarranged. These cars were moved in general traffic with no restriction or special handling. It is recommended that Fig. 19 be revised to omit these two items of securement.

Reason: The cost of applying this securement is expensive to the shipper and it appears to be of little value in preventing the disarrangement or shifting of lading.

Item 6—Recommend that specifications be developed to cover the loading of box shooks. (A copy of blue print and specifications developed by the Southern to cover the securement of this type of lading was attached —EDITOR)

Reason: The loading of shooks continues to be a problem, especially for the Southern, and therefore, the loading rules should include a specification covering the loading of this commodity.

Item 7—Recommend the use of Item YYY, as shown in Fig. 3, Supplement No. 1 to Pamphlet MD-6, be extended to all other graders of similar type in Pamphlet MD-6.

Reason: Believe this should be done as a matter of consistency.

Item 8—Recommend that in connection with the next re-issue of Pamphlets Nos. MD-1, 2, 3, 4, 5, and 6, consideration be given to revise the first paragraph of General Rule 9 in those pamphlets to coincide with the provisions of Rule 9 in Pamphlet MD-7.

Reason: The requirements of General Rule 9, Pamphlet MD-7 are more clearly defined and not as restrictive as the same General Rule in the other MD pamphlets, therefore, if not otherwise objectionable, it would seem desirable to have General Rule No. 9 read the same in all the pamphlets.

Item 10—Par. G of General Rule 4, as contained in all of the MD pamphlets reads: "Bearing pieces lengthwise of car, of suitable strength and length to provide for extended distribution of weight over the specified spaces shown in the above table, may be used."

It was recommended that consideration be given to revise and include in Par. G. specifications to cover the kind and size of bearing pieces required for various weights, of concentrated loads.

Reason: This should tend to eliminate or at least reduce the present frequent use of improper bearing pieces.

From observation of loaded cars shopped for repairs, the committee felt that there is still an urgent need for closer inspection of loads on open-top cars at point of origin to see that lading is secured in full conformity with the applicable rules. There also is a similar need to eliminate or reduce shifting or disarrangement of lading due to rough car handling.

This report was prepared by a 13-man committee headed by Chairman A. H. Petersen, superintendent car department, Belt Railway of Chicago.

How To Pick the Right Lubricant

The lubrication of any equipment breaks down into the lubrication of the component parts which is the same regardless of the device in which the parts are used. In air brakes, there are metal to metal, rubber to metal, and metal to plastic contacts, each type basically representing a different lubrication problem. Relative motion between such parts is usually rather slow or is only momentary thus simplifying their lubrication needs somewhat. However, with some of these metal to metal and metal to plastic contacts, conditions are present which may produce "fretting", a form of wear that occurs when two materials are rubbed together with a reciprocating motion of limited amplitude.

(*Continued on page 112*)

MBMA Covers Steam and Diesel Subjects

Steam generators, diesel welding, cooling systems and stationary boilers among topics presented

F. R. Milligan, President

A. F. Stiglmeier, Sec.-Treas.

ALL ADDRESSES and reports for the cancelled Master Boiler Makers' Association's 1954 annual meeting were presented and accepted at a meeting of its Executive Board and committee chairmen on August 18, 1954, at the Hotel Sherman, Chicago. Abstracts of three of the six reports appear in this issue; other reports will be included in a later issue.

President F. R. Milligan, general boiler inspector, Canadian Pacific, presided at the meeting. In his address he reported on the decision of the Executive Board early this year to complete and present all papers and to publish them in the 1954 Proceedings of the association which will be distributed to the membership later this year. In this manner, he said, the Master Boiler Makers' Association is continuing to make available valuable information for the benefit of all railroads and it is also doing its best to keep intact its unbroken record of over 50 years of service to the industry.

A. F. Stiglmeier, secretary-treasurer and retired general supervisor of boilers and welding, New York Cental, also addressed the meeting. In his address he stressed particularly the greater importance of the 1954 published proceedings in maintaining the continuity of association work and fulfilling the object of the association, "the improvement of our members by an exchange of ideas."

In addition to the topic reports the program included messages from R. M. MacDonald, director of operations. Board of Transport Commissioners for Canada, and R. A. Benger, chief of motive power and rolling stock, Canadian Pacific, and a written address on safety by E. G. Kiesele, superintendent of safety, Chicago, Milwaukee, St. Paul & Pacific. Both Mr. MacDonald and Mr. Benger expressed their disappointment with respect to the cancellation of the regular annual meetings and indicated their continued support and backing to the future activities and work of the mechanical associations.

Mr. Kiesele, in his paper on safety, emphasized several factors that have contributed to the 44 per cent reduction in the casualty rate on American railroads during the past ten years. Among these factors are (1) the greater interest of executive officers in safety, and (2) the better leadership of the supervisors because it is "not only what the foreman says about safety but the manner in which he says it that will either breathe life into the safety cause or bring about its early and complete collapse." Mr. Kiesele also stressed the importance of continually reminding ourselves to do the right thing for our protection and the need for avoiding telling the same safety story over and over in the same way; variety is essential to keep safety from becoming repetitious and boresome.

Oil Problems in Diesel Cooling Systems and Boilers

Present day practices demand more compact steam generating equipment of higher capacities. Heat release of 1,000,000 Btu per hr per cu ft are not uncommon. Furthermore, residual heated water capacities are low in terms of lb-per-hr output. Expansion of existing facilities has placed an unprecedented demand on old steam generating equipment. The importance of clean boiler interiors is emphasized by the fact that for each 0.001 in. of scale, there can be a rise of 10 deg F in operating temperature of the sheets.

Oil in contaminated feed water which is found as free oil, emulsified oil or as soluble oil wastes created by sulfonation of petroleum distillates, is frequently overlooked or neglected. Many do not realize that oil coated sheets will cause as much or more damage than scale to generating equipment.

The problems of oil contamination in boiler feed water, boiler waters, condensates and exhaust steam is difficult due to the limitations of accurate methods in evaluating oil concentration. Sampling

methods, extraction methods and type of solvent used leaves much to be desired as to accuracy and actual identification of the oil characteristics.

Oil in Diesel Cooling Systems—While deleterious effects of oil in the cooling systems of diesel locomotives are not as dangerous as those with steam boilers, nevertheless they can be just as serious and costly. The damaging effects of oil in cooling systems are:

1. Overheating of cylinders which causes loss of efficiency along with excessive ring and cylinder liner wear.
2. Destruction of natural rubber hose connections.
3. Presence of oil interferes with the effectiveness of cooling water corrosion inhibitors.
4. Oil may have some damaging effect on the synthetic ring seal material used to seal the cooling water from passing into other compartments of the engine.
5. Oil interferes with the testing of the amount of cooling system treatment.

In rare cases soluble oils may be present in the water added to the cooling system. In most cases, the oil contamination of the cooling system is due to leaks in the lube oil cooler allowing lubricating oil to contaminate the cooling water. Oil in the cooling system can be readily recognized and the lube oil cooler should be examined and repaired without delay. Diligent maintenance of this cooler will result in complete elimination of the oil contamination.

Diesel manufacturers have definite instructions covering the cleaning and removal of oil. One manufacturer recommends the use of trisodium phosfate. Another goes into more details and recommends Kelite No. 184, Oakite Penetrant, Pennsalt No. 32 or Turco X in the proper concentration. There are other excellent alkaline cleaners available.

These cleaners are circulated in the system at recommended concentrations for the proper length of time, drained, the system flushed with water, then refilled with a properly treated water and properly inhibited. Some of the railroads have used cooling system cleaners of their own manufacture and have developed a proper dosage and cleaning method to suit the material used.

If an improperly treated cooling water has been used which has caused an accumulation of scale and rust to deposit and partially plug the cooling system, it will be necessary to circulate one of the acid type cleaners for about 30 min or until examination shows the system to be clean. The systems should then be flushed thoroughly, then refilled with properly treated and inhibited water.

Oil Problems With Boilers—Oil contaminated feed water has an adverse effect on boiler water treatment. Oil destroys the coagulation of suspended solids and may increase scale formation. It is adsorbed by the sludge and will cause an otherwise excellent treatment with a fluid sludge to result in a pasty and adherent mass that is very adhesive.

It is difficult to remove by blowdown and it has a tendency to adhere to hot surfaces and char, there to act as a nucleii for additional accumulation. Where circulation is poor, the sticky masses accumulate, which can be in water legs and up between the flues. Modern practice has dictated more phosfate treatment due to its superior performance in preventing silica scale formation. Unfortunately, the resultant sludge is more oil adsorbing than carbonate sludge and for this reason less oil can be tolerated with phosfate treatment.

The presence of oil also causes difficulty in boiler washing. The sticky sludge adheres persistently, hides out in the inaccessible points, clings in heavy layers to the roof sheets and in general makes boiler washing a difficult and tedious chore. Failure to recognize the damaging effects of oil in the boilers when washing and inspecting and to take immediate steps to eliminate the oil when it is known to be possible, has caused millions of dollars worth of damage.

A new, repaired or reflued boiler should be boiled out to remove oil and oily spots resulting and remaining from the work. It is well to remember that under no circumstances should boiling out with caustic soda be attempted as the high concentration of caustic sets up the boiler for serious sheet cracking, commonly called caustic embrittlement. There are many excellent alkaline cleaners on the market for this purpose.

The possible sources of oil contamination are different for stationery boilers than that of locomotive feed water supplies. The methods of contamination in general are as follows:

LOCOMOTIVES

1. Low pressure cylinder exhausts through feed water heater or exhaust steam injector.
2. Overlubrication of auxiliaries, stoker engine, feed water pump and air compressor.
3. Raw water supplies.
   a. Natural sources and oily matter from decaying organic matter, more especially certain types of algae.
   b. Refinery and industrial wastes.
      (1) Emulsified and free oil.
      (2) Water soluble oil created by sulfonation of olefins, etc.

STATIONARY BOILERS

1. Exhaust and condensed steam from power plant auxiliaries.
2. Exhaust and condensed steam from jet condensing turbines which are driven by low pressure exhaust steam from air compressors or engines.
3. Oily condensate from fuel oil heaters which are defective as well as from defective process heating.
4. Contamination of raw water supplies.

Frequently reduction in oil contamination of a locomotive boiler can be accomplished by strict regulations covering the lubrication of the auxiliaries to prevent excessive feeding. The use of mechanical lubricators with a drifting throttle on long downhill grades literally pumps the raw free oil directly into the boiler via the open feed water heater.

With this type of operation and with feed waters of low suspended solids content, the oil accumulations can be of serious consequence. Where feed waters with a high magnesium content are constantly used, the magnesium hydroxide will assist in oil reduction and its removal through the blowoff cock will control excessive accumulations. Calcium carbonate likewise assists in oil reduction.

With soft feed waters and heavy oil contamination, periodic boiling out with alkaline cleaners appears to be the only solution. Where closed type feed water heaters are used and the condensate is returned to the locomotive tender, an oil skimmer is provided, eliminating the oil before it reaches the tender. It is possible for oil contamination to occur in water sources and find its way through the railway road storage tank to the locomotive tender. In those cases, it may be necessary to provide coagulation, even possibly acidification, followed by neutralization and filtration.

The American Boiler Manufacturers Association requires that the total quantity of oil or grease which is extractable by sulfuric ether or chloroform from an acid solution of boiler water shall not exceed 7 ppm. In any event, all precautions should be taken to keep the oil as low as possible. Under average conditions, the following rules are applicable to locomotive boilers:

1. If the oil concentration in the boiler water is 0.42 gpg or less, satisfactory operation can be expected.
2. If the concentration is more than 0.42 gpg but less than 1 per cent in the sludge present, it will be safe.
3. If the concentration is more than 0.42 gpg or more than 1 per cent in the sludge, trouble can be expected from oily scale, oil burns and foaming.

The presence of oil is easily detected by the use of an ultra-violet light. Exposing a boiler water or condensate sample to this (black light) causes the water to fluoresce or develop rainbow-like colours. This method merely indicates the presence of oil but does not evaluate the total amount. For a method that is more accurate, see Betz Handbook of Industrial Water Conditioning, page 240.

During the war there was developed a new type of pressure filter that eliminated the many disadvantages of the filter bed and the necessity of providing adequate coagulants in order to reduce the emulsified and colloidal oil below 0.1 ppm. Generally speaking, the term Diatomite filter will include all of the various types that consist of a pressure vessel using a septum constructed of porous stone, a vitrified aluminum oxide veneer tube, wire cloths, wire wound tubes and similar construction.

First cost for this type of equipment is higher than that for conventional type pressure filters, however they require less technical supervision and have low operating costs. Nominal costs for oil removal are 1.5 to 5 cents per 1,000 gal of condensate.

These data were abstracted from a report on "Study of the Effects of Oil in Feedwater of Locomotive and Stationary Boilers and Water in Diesel Cooling Systems with Recommendations of Methods to Eliminate Same." H. M. Schudlich, engineer of water service, Northern Pacific was chairman of the Committee.

Cleaning, Repairing and Testing Steam Generator Parts

The need for cooperation between railroads was never greater than it is today. Railroads are confronted with the keenest types of competition and for this reason everything must be done in order to keep the costs of operation as low as possible.

Due to the large number of component parts on the two major type steam generators for locomotive service, only the items of greatest importance will be discussed. Therefore, the topic has been divided into three groups. The first group will cover the Vapor Clarkson steam generator, manufactured by the Vapor Heating Corp., the second group will cover the Elesco generator, manufactured by The Superheater Co., Inc. and the third group will cover the broad subject of refractories.

Group 1—Vapor Clarkson Generator

ITEM 1—BLOWER HOUSING, STEAM SEPARATOR JACKET AND SMOKE HOOD ASSEMBLIES.

Method of cleaning—(a) *For units in service on locomotives.* Before cleaning, all electrical controls and wiring must be protected from moisture. The floor stand around the steam generator must be covered with rags. A liquid cleaning solution is sprayed over the entire steam generator and allowed to soak for approximately 15 min, after which it is rinsed off by using a gun or nozzle to blast clear water under air pressure to remove cleaning solution and dirt. With this method, a minimum amount of water is used which is easily wiped up with the rags that were placed on the floor.

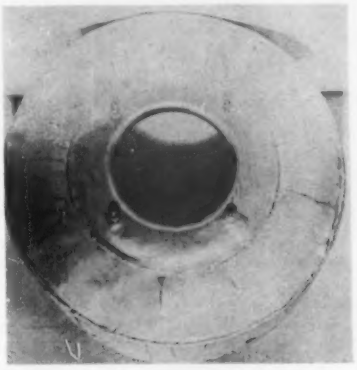
(b) *For units that are removed from the locomotive for general overhaul.* After the jacket has been stripped of piping and controls, jackets are sand blasted to the bare metal.

METHOD OF REPAIR

After sand blasting, a careful inspection should be made for warpage, deterioration or other damages. Damaged sections are usually cut out, new sections are fabricated and applied. Warpage, due to overheating, often affects even the heaviest of metals or stiffeners. It is very important for proper alignment of the steam generator assembly, that stiffeners be brought back to their original shape and position.

Overheating also often damages the insulation between the inner and outer casing sheets. In such a case, it is necessary to remove the damaged sheet or sheets and the insulation. After removal, new insulation, such as corrugated asbestos or fiberglass of varying thicknesses and inner sheet, usually ⅛ in. sheet steel or outer sheet usually 1/16 in. is applied.

Fire pot with edge of the center hole badly burned and warped.



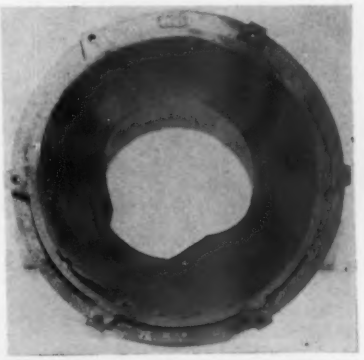
By use of a proper die and hydraulic press, a new section was fabricated and welded into place to repair the damaged fire pot.

After the necessary repairs are made, the bottom of the base assembly is painted with an asbestos base paint and outer surface or sides is painted with two coats of high temperature paint that will withstand temperatures up to 1,200 deg F.

ITEM 2—DOME ASSEMBLIES

Method of cleaning—Sand blast to the bare metal.

Method of repair—After the assembly is cleaned, a careful inspection is made for damaged sections. They can be repaired using the methods described for Item 1. Most shops have fabricated proper fittings or forms to use when new sections must be applied, which are necessary for proper alignment of the assembly.



Top of a damaged burner cone assembly. The inner sheet is burned, warped and torn away from the weld.

The repaired assembly. Repairs were made by marking off, with a template on 1/16 in. Inconnel sheet, a new inner liner, cutting and rolling to the proper size and shape; after which the old sheet is cut out and the new welded into place.

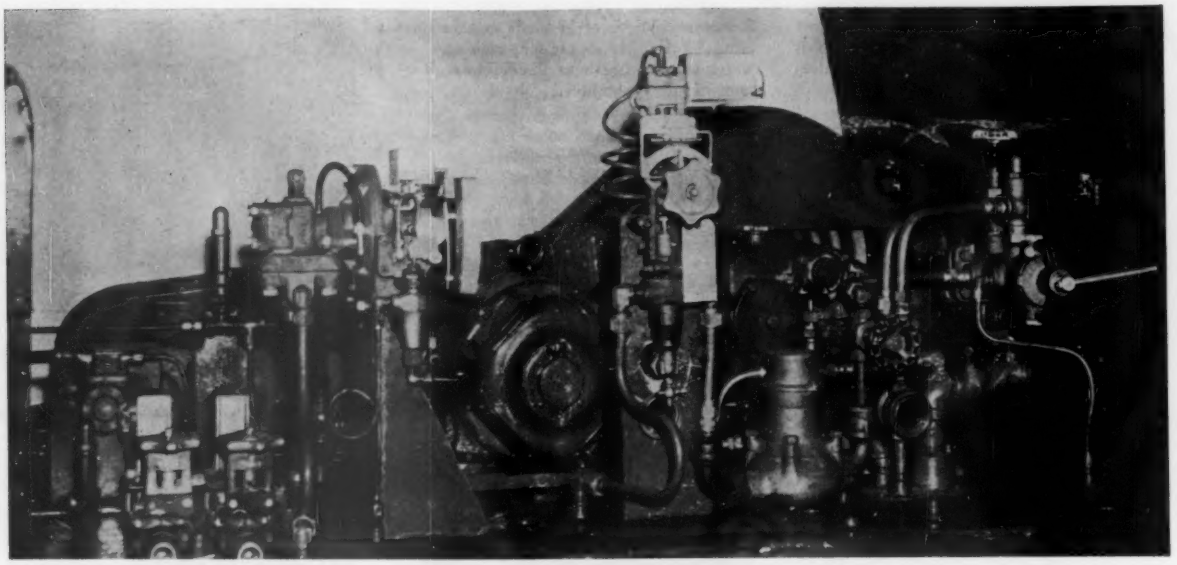
The height of this assembly, in relation to the stabilizing cone which is mounted on top of the fire pot assembly, is very important. If the distance is not correct, the spray pattern from the nozzle will cause a portion of the fuel oil to bounce off the top edge of the hole in the fire pot which in most cases causes faulty ignition by dousing the electrodes. This also causes excessive smoking due to the fuel oil wetting the top of the fire pot and not burning properly.

Sheet steel, 1/16 in. thick is used in repairing the greatest portion of the dome assembly. Some of the earlier designs have a bolting ring made of ¼ by 1 in. steel, which fastens the assembly to the top of the steam generator. After all repairs are made, two coats of high temperature paint are applied.

ITEM 3—FIRE POT, AIR RING AND BURNER CONE ASSEMBLY

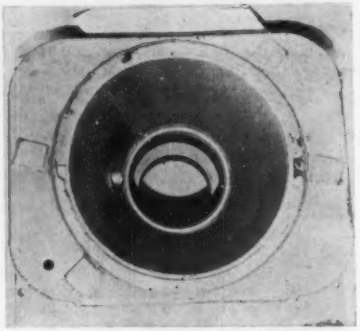
Method of cleaning—Sand blast to the bare metal.

Method of repair—The major portion of these three assemblies are in direct contact with the fire. Therefore, they are



Many shops are equipped with special racks for testing the various controls of the steam generator. One such rack is shown here.

This burner windbox is badly damaged, warped and opened, due to overheating.



The same burner windbox. The damaged section was cut out and a new section applied.

subject to damage from heat. Damage to these parts is usually caused by improper distribution and circulation of air furnished by the blower.

Some shops are equipped with the dies and machines required to fabricate these parts as complete assemblies or for repairing sections.

The type of metal best suited for the fire pot is "Inconnel". There are several types of stainless steels available as a substitute, but these do not have the service life of the preferred metal and should only be used if Inconnel is not available.

Repairs to the fire cone assembly can be made by marking off, with a template on 1/16 in. Inconnel sheet, a new inner liner, cutting and rolling to the proper size and shape; after which the old sheet is cut out and the new sheet welded in place.

Air rings are also repaired and complete assemblies made when required, by using special forms to hold the assembly in place, after shaping, for welding. Inconnel metal is used for fabricating these rings.

ITEM 4—SERVO FUEL CONTROL, WATER BY-PASS REGULATOR, STEAM TEMPERATURE LIMIT CONTROL, FUEL SOLENOID VALVE, PRESSURE GAUGES GRADE B, HEAT EXCHANGER COIL AND HEAT EXCHANGER

Method of cleaning—There are numerous solutions on the market suitable for cleaning the parts for the above controls. When controls are defective or due for overhaul, they are taken apart and each item thoroughly cleaned for inspection. Each part should be thoroughly checked for defects and those worn beyond the condemning limits are scrapped.

Group 2—Elesco Steam Generator

ITEM 1—HEATING SURFACES

(a) *Type and size of materials used in fabricating*—The tube material is 1-½ in. outside diameter, No. 10 B.W.G. min, cold drawn seamless carbon steel tubing, ASTM Spec. A-192, latest issue. The material used for the fins is 3/16 in. thick, hot rolled steel strip, AISI C-1010, 0.040 in. slit. Material for the shroud is No. 16 gage, 0.062 in. thick, stainless steel, type 309 (25-12). The welding rod used to weld the shrouds is 3/32 in., Type 309 Arcaloy. This rod can be used for welding stainless to stainless as well as stainless to carbon.

(b) *Method of cleaning before repairs*—After removal of the shroud, the interior of the heating surface is acid washed according to instructions furnished by the manufacturer in Bulletin No. 10,652-1. The exterior of the tubing is sand blasted.

(c) *Preventive measures against deterioration after repair*—After repairs, the heating surface is filled with a rust preventive. After filling, the preventive solution is blown out and blowing is continued until this solution coats the coils and is thoroughly dry. Before application of the shroud, the heating surface is dipped in a rust preventive paint, of which there are several on the market.

(d) *Sections or parts found to wear*—It is impossible to state which part or section may wear the most. This will depend entirely upon the nature of the water treating program.

(e) *Method of testing*—The heating surface is subjected to 1,500 lb per sq in. hydrostatic pressure, both before and after repairs.

ITEM 2—CASING

(a) *Type and size of materials used in fabricating*—The inner casing sheets are No. 14 gage, 0.078 in. stainless steel, type 309 (25-12). Outer casing sheets are of carbon steel of the same gage although heavier can be used.

(b) *Method of cleaning before repairs*—The exterior of the casing is sand blasted before repairs. The interior is not cleaned as the inner casing sheets, floor brick and all insulation is removed if damaged.

(c) *Preventive measures against deterioration after repairs*—After repairs, the ex-

terior casing is sprayed with one coat of undercoat fast dry gray and one coat of suede gray finish.

(d) *Sections or parts found to wear*—Casing repairs are generally required due to warped inner casing sheets and no correction can be made to correct same other than improving water treatment to prolong heat surface life. If heating surfaces do not burn out, there will be no deterioration of the casing.

(e) *Method of testing*—No tests are required.

ITEM 3—BURNER WINDBOX

Method of cleaning—Sand blasting to bare metal.

Method of repair—The only portion of the burner windbox which is subject to deterioration and to which repairs are required, are the cone and ring. The cone is made of No. 11 gage, 0.125 in. stainless steel, type 309 (25-12). Windboxes are sand blasted and the cone and ring are removed. The outer windbox case is straightened out and a new cone and ring applied. No tests are necessary after repairs. The exteriors are painted with a suede gray finished coat.

ITEM 4—DAMPER OPERATING CYLINDER

Method of cleaning—Muriatic acid solution of 50 per cent strength. Rinse thoroughly with soda solution and clean water.

Method of repair—Damper operating cylinders are changed out at first indication of being defective. After this cylinder has been removed, it is disassembled and each part is thoroughly checked for defects. The cylinder must be carefully checked for pitting, those that are pitted must be scrapped.

When cylinders are disassembled for any reason, new seals are applied and springs are carefully checked for cracks by the Zyglo process. They are also checked to see that they have not taken a set. Proper operation of reworked cylinder is checked on a test rack, by applying fuel oil pressure slowly until approximately 200 lb pressure is reached and then decreasing the pressure slowly, checking free movement of piston and seals for leaks.

ITEM 5—DIFFERENTIAL PRESSURE VALVE

Method of cleaning—Muriatic acid solution of 50 per cent strength. Rinse thoroughly with soda solution and clear water.

Method of repair—Little difficulty is experienced with this control. The greatest cause for removal and reworking this valve, is leaks developing in the bellows convolutions. In operation, this results in near equilization of pressure on both sides of the bellows thereby causing a resulting movement of the lever attached to the bellows which operate a switch shutting down steam generator.

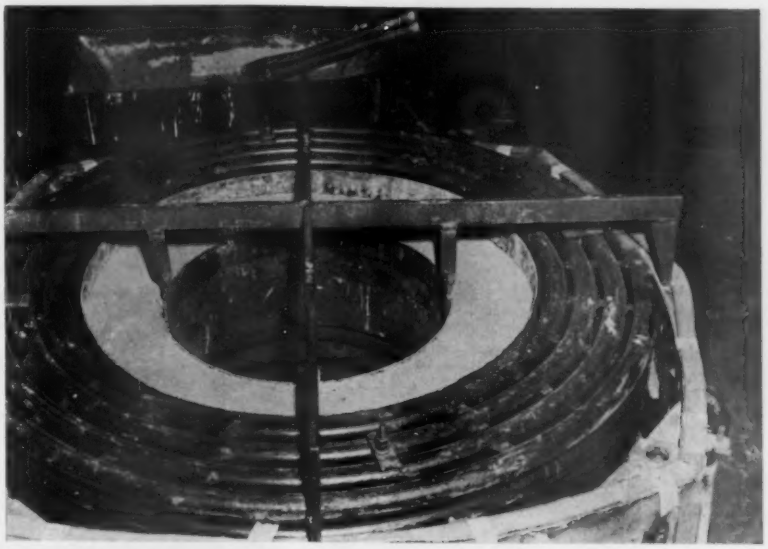
When valve is disassembled and parts are thoroughly cleaned, they are carefully inspected. Springs are checked for set and inspected for cracks by the Zyglo process. With the aid of a special jig which will not allow the bellows to expand, water pressure is applied to check for leaks in the convolutions.

After valves are assembled they are tested on a rack, by applying two separately controlled pressures one on each side of the bellows, watching for free movement of the lever, checking the travel and through test lamps attached to the switches making certain they operate as intended.

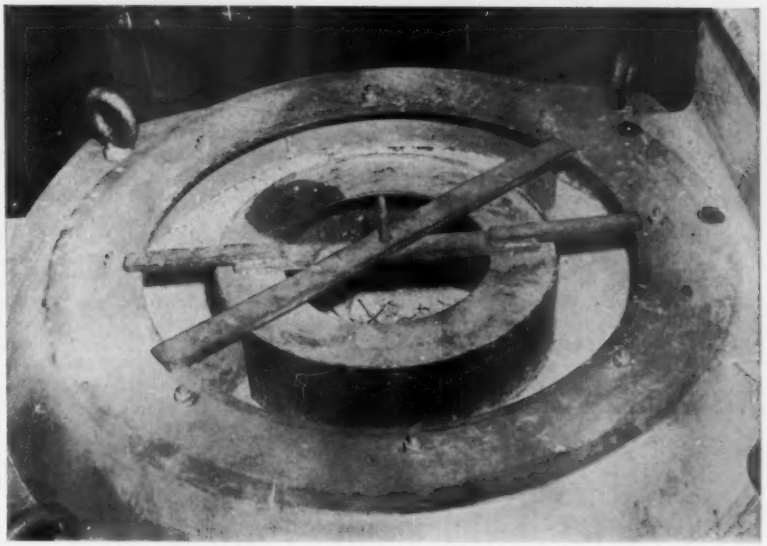
When movement of parts are correct, test lights will operate as follows:

Lights go on for OFF FIRE from 14 to 16 psi.

Lights go off for ON FIRE from 16 to 20 psi.



Form used in applying refractory to coil retainer. Refractory has been rammed in place to the height of the template. When set, the form is removed.



Form and gage used in applying refractory to an OK-4625 type Vapor Clarkson steam generator.

ITEM 6—HEAT EXCHANGER

Method of cleaning—Muriatic acid solution of 50 per cent strength. Rinse thoroughly with soda solution and clear water. The heat exchanger coil is subjected to a 500 lb hydrostatic pressure. This particular item is not manufactured in such a manner as to be suitable for repair. If the coil leaks, a new heat exchanger is furnished.

ITEM 7—CIRCULATING PUMP

Method of cleaning—The circulating pump is boiled in a lye vat to clean the exterior. The interior of the pump is cleaned with a muriatic acid solution. After dismantling,

the parts are checked for wear according to limits given in manufacturers' Bulletin No. 4. After assembly, the pump is painted with heat resistant aluminum paint.

Method of repair—When making repairs to equipment, any parts which might even be questionable are renewed. The clearance between impellers and wearing rings is always brought back to new pump tolerances.

ITEM 8—FEED WATER PUMP

Method of cleaning—The feed water pumps are boiled in a lye vat before repairs.

Method of repair—Repairs are made in accordance with Bulletin No. 10,601-1. The bulletin also includes a method of testing the pump. After repairs, the pump is painted with a heat resistant aluminum paint. The parts which are found to wear the quickest, include the steam cylinders, steam piston rings, steam valves, and steam valves seats.

ITEM 9—STEAM SEPARATOR

Method of cleaning—The exterior should be sand blasted, the interior acid washed.

Method of repair—The first step is thorough examination, noting any shortcomings that require attention. This inspection includes Zyglo inspection for fin cracks, etc. The second step is to blank off all known defective circuits and apply a hydrostatic test at approximately 1,000 psi to make certain the surface is adequate for the operating pressure and that all leaks have been located. The third step is internal inspection to note the presence or absence of scale, condition of threaded openings, etc.

Following repairs and modernization, the surface is subjected to a second hydrostatic test, and if tight is acid washed; followed by a third hydrostatic test. Assuming that all items have been corrected and the surface is known to be tight, all water is blown out and a shroud applied.

External protection is provided by dipping the surface in an asphalt base paint.

Group 3—Refractories

It is the general practice of most railroads to make an interior inspection of the steam generator every 30 days. At this inspection, the refractories are carefully checked for possible thermal spalling (overheating, falling away or cracking).

Overheating of the refractory is usually noticeable by the appearance of the refractory surface, being loose, or porous and dull in color. Damaged sections must be repaired or renewed at once. If allowed to remain in service, they will soon fall apart and cause damage to the internal metal parts.

After the old refractory has been properly prepared for repairs, required amount of new refractory which is an air setting castable, is mixed and applied either as a coating or ramming mix.

When castable refractory is first placed in service, the steam generator must be held in the lowest possible firing position for approximately 1 hr, allowing all moisture to dissipate. With the pre-baked segments the 24 hr period required for setting and the one hour period for moisture to dissipate at low fire is not required, and for this reason is preferred by many railroads. When the time required for this operation is not objectionable, savings can be made by using castable refractories.

Shops where refractories are applied must either make or buy from the steam generator manufacturer, forms and templates to properly cast refractory to the various portions required. Base refractories under coils, consist of approximately 4 in. of insulating castable and 2 to 3 in. of regular refractory castable.

This is an abstract of a report on the "Study and Recommended Practices of Cleaning, Repairing and Testing Component Parts for Steam Generators." Andrew J. Ritter, supervisor diesel locomotive maintenance, New York Central System, was Chairman of the committee.

How To Wash and Maintain Stationary Boilers

The education of power plant employees to properly handle water treatment *is in many cases neglected and should receive greater consideration and attention.* In order to increase the washout period, the water side surfaces of the boiler must be kept free from scale and corrosion. At the same time, the boiler and appurtances must be propery operated and maintained and the fireside surfaces must be kept clean and free from slag and soot deposits.

Proper operation and maintenance of the boiler's firing equipment is also essential to an extended washout period. Equipment for adjusting draft, checking stack temperatures and CO_2 should be properly maintained and operated. Fireside deposits must be held to a minimum. To prevent slag and soot deposits, it is frequently advantageous to use combustion catalysts which will lower the ignition temperatures of the soot and permit it to be burned in either coal or oil fired boilers. This makes soot-blowing unnecessary and utilizes heat units which would be wasted.

The extension of the washout period thus requires correct water treatment and control, correct operation of the equipment and good maintenance. When these are combined without failure, the washout period can be extended.

Considerable damage has resulted when boilers have been tied up without adequate protection. Precautions were not taken to prevent corrosion of the boiler metal when the boilers are idle. Costly repairs to large boilers can be prevented by proper handling.

The primary requirement for increasing the washout periods on stationary boilers is to make certain that when they are down for annual hydro test and washout, that heating surfaces both internal and external are thoroughly clean.

To accomplish this it is necessary in the case of internal surfaces to make sure that all oil or other foreign matter is boiled out, when boiler is first put in service, and to make certain that the repair job is done with all foreign matter removed. If scale formation is severe, it can be removed by means of a tube rattler, chipping hammer or acid washing. Loose scale left in a boiler or a build up of scale in inaccessible places that could break off can become the cause of failure between washouts by being deposited on heating surfaces.

Length of time between washouts and cleaning of all boilers depends on conditions of the water used and the amount of make-up required. Railroads extend over a large area, therefore, use water from different sources. This water is of different chemical content, different hardness and different scale forming properties.

The amount of scale formed is controlled by proper water treatment and the amount of proper blowdown. The effectiveness of water treatment is governed by proper supervision and regular testing of the raw water and the water being used in the boiler. Therefore, water treatment should be left to experts.

Cleaning the boiler internal surfaces depends on the scale formation, and each case should be handled as individual conditions require. Design of the boiler governs the time and cost of cleaning, regardless of the method used. Fire tube boilers of locomotives type and some other types of fire tube boilers can go much further than water tube types without becoming unsafe due to scale.

Manual cleaning is the method with which boilermakers are most familiar. A boiler can be cleaned manually very effectively. If it is of fire tube construction, it can only be cleaned partly, and there are surfaces that can only be cleaned by removal of tubes, staybolts, stay braces, etc., and as most stationary boilers of the fire tube type are not affected too much by cinder cutting, and if the tube ends are free from dampage and external corrosion, the tubes will run for years without removal if the external surfaces are kept fairly clean.

Acid cleaning of power plant boilers and its connecting parts is now becoming common practice. This method is proving to be less expensive, as the availability of the boiler is increased by a substantial amount. It is far more effective as the acid will reach parts and clean those parts that cannot be reached by manual cleaning.

Acid cleaning should be under the super-

(Continued on page 126)

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Locomotive Road Supervision Becomes More Complex

L. W. Peters,
Sec.-Treas

W. H. Fortney,
President

Among the subjects prepared for cancelled annual meeting of Railway Fuel and Traveling Engineers' Association are train radio communication and automatic train control and train stop equipment.

REPORTS ON diesel locomotive improvements, on heavier diesel fuel oils, on diesel locomotive trouble shooting, on the operating characteristics and maintenance requirements of train radio communications, and on the problems of reducing loss and damage due to impact are among the subjects on the program of the Railway Fuel and Traveling Engineers' Association for its annual meeting scheduled for September 13-15, which was cancelled. Papers and reports on these and other subjects, however, were completed and are summarized in the following pages.

Papers not included in the following pages were prepared on Budd RDC cars* and on automatic train control and Automatic Train-Stop Equipments. The paper describing the Budd car was accompanied by a manual of trouble shooting in connection with the operation of these cars. This and a series of questions and answers for train-service and mechanical-department personnel on automatic train control and automatic train stop will appear in early issues.

Officers of the Railway Fuel and Traveling Engineers Association for 1954-55 are those elected at the 1953 annual meeting. These officers, listed on another page, will hold office until election at the next annual meeting.

* These cars were described in Railway Mechanical Engineer for October, 1949, page 543.

Diesel Trouble Shooting On the Road

This subject is one which has confronted the users of diesel locomotives since their beginning. More knowledge is necessary as the diesel has become accepted for general use and to a great extent has replaced steam power.

Trouble shooting on line of road involves many things which must be given consideration in discussion of the subject which determines the desired results, or the results actually obtained on a given railroad.

First, is it the desire of management in case of trouble with the locomotive on the line that everything be done that is possible to keep the locomotive running and to maintain a schedule where it may be done safely? Furthermore, is it the desire that only certain things be done and in most cases that the engine be shut down or the unit causing trouble be isolated and towed to a shop for correction of the trouble or repairs?

Second, does the management provide books and instructions in an effort to acquaint the personnel with all phases of operation, troubles, and equipment? In case of trouble, the operating personnel will then have a good understanding of how the locomotive should operate and apply a remedy if it is possible.

Third, the man is the most important link in the matter of trouble shooting on line of road. What is his attitude, is he interested, does he like his job, does he try to learn, or is he simply a rider and waiting for pay day?

Diesel Troubles—Diesel locomotive troubles can be divided into six general conditions. If the operating personnel would concentrate on the one giving the simplest indication, the others in many cases would correct themselves. Therefore, approach troubles in this manner:

1. Starting the diesel engine—make certain it is running.
2. Run the engine safely—cooling, lubrication, fuel and mechanical.
3. Speed the diesel engine—it must drive the generator.
4. Air system and brake troubles.
5. Engine loading—power.
6. Steam generator troubles—where used.

The problem of trouble shooting is one of education, not only of the engine crews who operate them, but of others who have anything to do with them. Therefore, when trouble occurs, if one man does not know what to do, someone else will, and can pass the information along quickly to those who need it at the time and thereby prevent many failures or delays.

Records are available to show that in most every case of trouble just one thing was wrong. If the man on the locomotive knew what to do the trouble could have been remedied quickly and a delay or failure prevented. In many cases a remedy can be applied in 5 min. which may have taken hours to find. Therfore, the hours finding the cause is to be avoided. The 5 min used to fix the trouble would be ideal.

Poor Maintenance Causes Road Troubles—The majority of road troubles can be prevented by proper maintenance in the shop as most troubles can be traced directly back to poor maintenance. The equipment was not in good condition when it left the shop, the condition grew worse, causing the lose of an engine, a delay or a failure. The road man is expected to do what the shop failed to remedy in an effort to keep the locomotive running. Many times there is no remedy on the road.

As an example, bad brushes on a traction motor or main generator which should have been renewed in the shop continue to flash, thereby tripping the ground relay. Finally, it cannot be reset and power is lost to the engine. If it is a single unit, failure results. If the ground relay is cut out, a motor or main generator will be badly damaged, still resulting in a failure and excessive expense.

In other instances, the fan belts are loose and the engine cannot be kept cool and finally becomes too hot and has to be shut down with loss of power. The governor on a compressor is set too high, it continues to pump, becomes too hot and burns up. Here, the solution, but not the answer, is to shut down the engine or it will melt the discharge pipe loose on the compressor with complete loss of air and a locomotive failure

To a great extent, prevention is the best possible remedy. As near perfect maintenance as possible definitely reduces to a minimum the road troubles that will occur.

Other Troubles in Spite of Good Maintenance—With Perfect maintenance we accept the fact that any mechanical or electrical equipment is subject to failure or breakdown at times. This causes trouble on which a remedy must be applied to prevent a failure of that particular item.

For simplification, let us divide the troubles into mechanical and electrical. Of these, the average man can understand the mechanical equipment and the troubles that may occur on it or easily learn what to do. In most cases the trouble is simply mechanical on electrical equipment. The average diesel locomotive is 75 per cent electrical equipment and its troubles may be 90 per cent electrical.

A recent analysis of road troubles that have occurred over the past ten years in a diesel operation indicates that out of 500 items of trouble the same one will happen in one case out of 20. Another is one case out of 50, and still another in one case out of 100, while a new one pops up in about every case out of 500 that has never happened before to which an answer and remedy must be applied. The railroads first should try to make certain everyone understands those that happen most often and follow down the line with the less frequent items to get the men familiar with all the things that may happen and their remedies.

A simple breakdown of troubles has shown this: Car troubles which effect everything on the locomotive results in complete failure. PC switch tripped, fuses blown, brakes will not release, or no air to release them, causes lack of control of the locomotive or train.

Engine troubles: is it running hot, has low oil pressure, will not start, will not speed and we have lost the power of that engine or maybe a locomotive failure with a single unit and single engine.

Perhaps the most complicated of the troubles in which an engine is running, operating perfectly, will speed from the throttle, but will not load and there is no power from it.

Many such cases can be given with remedies applied which are simple to the man who knows just three things:

1. What is it? Learn what it is so as to report it or know where to find it.
2. What is it supposed to do? Why is it there?
3. How is it supposed to operate? What makes it work. If it is inoperative, make it do what it is supposed to and thereby effect the remedy.

The man who knows or will learn the answer to these three questions on any piece of equipment on a diesel-electric locomotive will be able to shoot trouble successfully.

This is an abstract of the Report on "Trouble Shooting on Line or Road Diesel Electric Locomotives" of which J. F. Sheneman, general diesel instructor, Southern was chairman.

How Can Heavier Diesel Fuel Be Used?

In casting about for means of reducing the fuel cost for the diesel locomotive, it is natural that considerable attention should be focused on so-called heavier fuels. Said J. L. Giboney, vice-president National Aluminate Corporation in his paper on the use of heavier oils for diesel fuel. While the principal purpose in considering their use is one of cost reductions, it would also be desirable in case of emergencies and to stretch the present diesel fuel supply.

Before getting into how these heavier fuels may possibly be used satisfactorily in railroad operation, he examined the changing diesel fuel supply and the steps the re-

President W. H. Fortney Speaks of the Railway Fuel and Traveling Engineers' Association

Mr. Fortney, in his remarks concerning the association and its work during the past year, which will be printed in the Association's year book, said that its purpose is to provide an organization for the improvement of its members by education and the advancement of the interests of the railroads by the exchange of ideas and by recommending the best methods of improving the locomotive service. He reviewed the programs of recent years and called attention to the subjects on which reports and papers have been prepared during the past year.

"I hope we will have a convention in 1955," he said, "and with the help of the executive members, we will do our best to have an interesting meeting. Future papers will possibly be on the gas turbine which is in an experimental stage today, and possible on the atomic locomotive which is still a designer's dream. But then, all things begin as dreams and must make their way into the world against doubt and derision. The future is a challenge to us all and we will meet it by bringing before our members all that we can find that is new and informative in our field."

fineries are taking to meet the increased diesel fuel demand. In 1953, the United States railroads consumed just a shade under 3 billion gallons of the fuel. This represented 44 per cent of the country's consumption. It is anticipated that by 1960 the country's total diesel fuel oil consumption will be 9 billion gallons of which the railroads will use 50 per cent.

Fuel Instability.—While cat-cracked diesel fuel has the valuable characteristics of higher volumetric heat content and frequently lower pour and cloudpoints, it has the serious disadvantage of being less stable in storage and under higher-temperature than the straight run products.

Instability resulting in the formation of sludge under heat and storage conditions such as exist in railroad storage and in locomotive operation may produce filter plugging, injector sticking, and poor combustion, which in turn may result in decreased engine cleanliness and increased wear.

Fuel Oil Treatments.—The cracked distillates, including diesel fuel and gasoline, can be made more stable either through the use of additional refinery operations or by means of suitable stability and dispersant additives. Additional refinery operations are generally more expensive than the use of additives.

The dosage of these fuel oil treatments is generally very moderate, the cost running only 0.3 to 0.9 of a mill per gallon in most cases.

Instability in the main storage tank can result in need for repeated cleaning and also excessive maintenance of the filters on the discharge side of the tank. On the diesel itself, this instability can result in increased filter maintenance under the relatively high-temperature conditions in the pre-combustion system.

Characteristics of Heavy Fuels.—Under our definition of a heavier fuel could be included fuels having lower cetane value, which is generally considered to be an expression of the ignition quality. Catalytically cracked distillates run 5 to 15 cetane numbers below straight-run distillates from the same crude source, while thermally cracked distillates are about another 10 cetane numbers lower.

Pour point will probable be a problem with some of the lower grade, heavier fuels. Pour point depressants are on the market, which are quite effective with some oils. In many cases they will be economical to use depending upon the amount of depressant needed, pour point required, and price differential between the regular and the heavier diesel fuel.

Under the board terms of our definition, practically all American railroads are on the verge of using heavier fuels. Some have already committed themselves very definitely to lower grade oils. In some locations the railroads can buy these heavier fuels at a very attractive saving. One railroad, for example, has already made extensive use of heavier oils, treated with stabilizing additive. With extension of use of this fuel to a system-wide basis, savings of $20,000 per month are anticipated.

Where a heavier fuel can be purchased at a reduction in price over regular diesel fuel, and it can be shown that it can be stabilized with suitable treatment, a very substantial saving is available to the road.

B-L-H Diesels MU with Those of Other Builders

Outstanding examples of improvements incorporated in its line of diesel-electric locomotives by Baldwin-Lima-Hamilton Corporation during the past year are the new dynamic braking installation on the 1,600-hp. all-service locomotives and units that will operate in motoring or braking with units of another locomotive builder. Several new locomotive models have been constructed for the army and foreign countries.

The experimental steam-turbine-electric locomotive* for the Norfolk & Western has been completed and is now undergoing tests before being placed in service.

The 1,600-HP All-Service Locomotive now features dynamic braking resistors in the radiator compartment where the radiator cooling fan is utilized for cooling both the radiators and dynamic braking resistors. The rear hood is now free for the application of a train-heating boiler or other large equipment. Various modifications, such as 24 RL brakes, humping control, increased weight to a maximum of 375,000 lb, are available.

Design changes in this model during the past year simplify and reduce maintenance and improve accessibility. The cabinet was completely enclosed and pressurized with filtered air. The cab support height was increased and the air-brake equipment was rearranged to provide improved accessibility. Air-compressor aftercooler pipes were replaced with finned copper tubing. The battery box on the right side of the locomotive was moved to the rear to provide greater accessibility to the main generator. All items of electropneumatic equipment were put in a conveniently located "valve compartment."

1,600-HP Locomotives for Operation with Other Makes—During the past year a dynamic braking controller and field loop circuit was developed and units were placed in service equipped for dynamic braking of B-L-H locomotives in multiple with General Motors units. The braking excitation (field loop) circuits were designed to provide equal braking effort on either of the manufacturer's units. The new controller produces a lower braking excitation (field loop current) on all units over the first portion of the braking range. This requires greater movement of the dynamic braking lever and thus a smoother braking control at high speeds. Units also were placed in domestic service that will operate in multiple with General Motors units in braking and motoring and with Alco units in motoring only. In order for these units to multiple with certain locomotives making use of manual transition, the master controller has a transition drum. A transition lever (selector) which rotates the drum controls manual-transition locomotives operating as trailing units in multiple with a Baldwin unit.

The transition lever also controls dynamic braking of the Baldwin unit operating singly or dynamic braking of the Baldwin unit when the lead unit is in multiple operation. An intermediate dynamic braking stop position prevents complete lever swing to maximum braking without some delay to manipulate the catch release as an instantaneous maximum application may cause serious damage.

I,500-Hp Road Locomotive for the Argentine. One of these locomotives was on exhibit at Atlantic City in June 1953.

1,600-Hp All-Service Locomotive for Brazil—These meter gage locomotives are rated at 1,600 hp for traction and are mounted on two six-wheel trucks, each truck having three motor-driven axles. All units are provided with MU control. The traction motors are a recent Westinghouse development for meter and 42-in. gage.

1,200-Hp Transfer Locomotive for Chile—A transfer locomotive has been built for a mining operation in Chile. It is provided with adjustable-gage trucks and was shipped adjusted for operation on 42-in. gage track to enable it to be moved on the railroads to the mining property. When put in operation on the mining property, it will be changed to meter gage (39⅜ in.). Dual station control is provided.

400-Hp Road Switcher for the Army—A versatile road switcher has been developed for the Army Transportation Corps. These locomotives have adjustable-gage trucks which can be varied from standard 4-ft 8½-in. gage to 5-ft 6-in. gage. They have domestic type A.A.R. couplers, foreign automatic couplers, and screw couplers with side buffers. Special heating equipment is provided for starting an operation at temperatures as low as —40 deg F. Provisions for operation at temperatures as high as 125 deg F are also included. The locomotives are being built with straight and automatic air brakes, but piping is installed for vacuum train brakes, if needed. All units have radio noise suppression equipment. Multiple unit control equipment is provided.

Diesel Hydraulic Army Locomotives—Two small experimental diesel-hydraulic

* This locomotive was described in the August 1954 *Railway Locomotives and Cars*, page 41.

locomotives have been constructed for the Army Transportation Corps. These are intended for use on light portable track. Wheels, axles, drive sprockets, torque converters, radiators and many engine parts are interchangeable. Both have maximum speeds of 11 mph.

The four-cylinder Caterpillar engine in the smaller locomotive develops 65 hp. The locomotive is an 0-4-0 type and weighs 18,400 lb. The larger locomotive has a six-cylinder Caterpillar engine developing 94 hp. This locomotive has an 0-6-0 wheel arrangement and weighs 28,000 lb.

800-Hp Switcher for Holland—Baldwin-Lima-Hamilton has completed the design of an 800-hp switcher locomotive for the Heemaf Corporation of Holland, a licensee of B-L-H and the Westinghouse Electric Corporation. One hundred locomotives of this design will be built by the Heemaf Corporation in Holland.

All Rules are Safety Rules

"Safety is of the first importance in the—discharge of duty."

"Obedience to the rules is essential to safety."

"To enter or remain in the service is an assurance of willingness to obey the rules."

With these quotations from the standard operating rule book, G. A. Robinson, general safety agent, Chesapeake & Ohio, began his talk on safety. He cited Rule M, which enjoins employees to take time to perform their duties safely, and said that if this rule were adhered to, many other rules could be eliminated. Many accidents, he said, are attributed to hurrying which, in the face of Rule M, is a poor excuse for an accident.

He then quoted Rule 99 and called attention to the fact that the rule says the flagman must go back immediately. The slightest delay, he said, may make the difference between stopping the following train properly or an accident. He did not attempt to define a "sufficient distance" which the rule says a flagman must go back, except to point out that the men in the cab of a following locomotive have a right to expect the flagman of a train ahead to flag his train properly. "Just be human," he said, "and do unto others as you would have them do unto you."

Mr. Robinson then discussed the rules which define restrictive signal indications. The approach signal, he said, is the most important, and advocated that the engineman begin to reduce the speed of his train as soon as the approach signal is seen at a distance, rather than to wait until the signal has been reached or passed. Each year accidents occur because of failure to act in sufficient time on the warning of the approach signal.

In closing, Mr. Robinson said that all rules, regardless of their names, are safety rules and have been written to prevent accidents which have occurred over the years. Supervisors who fail to require that those under their supervision understand and obey the rules, he said, have been unfair to themselves, their employees, and their company.

Employees—The Railroads' Greatest Asset

In an address prepared for presentation before the Railway Fuel and Traveling Engineers' Association, W. T. Wilson, assistant vice-president, personnel department, Canadian National, recalled his reference in his talk last year to the Canadian National staff college, the first session of which was held in 1953. The second session, he said, was held at Bishop's University, Lennoxville, Que. This was a seven weeks' course, the students in which were selected on a more restrictive basis than last year. Only men with a formal educational background of at least junior matriculation, whose salaries were at least $500 a month, or who were slated for promotion to a position with at least that salary in the near future, and who were not over 45 years of age, were eligible. The course, completed at the end of July, is considered to have been a considerable improvement over that of last year.

Mr. Wilson then reported progress in extending job evaluation and performance appraisal of employees across the continent during 1954. This project was undertaken because of the conviction that its employees are the railroad's most important asset.

Proper personnel management means not only the management of staff as carefully and as painstakingly as a comptroller manages his finances, but all that should be done for each individual subordinate to insure his fullest development as an employee. It means that each supervisor, instead of being content to put to use those merits which an employee demonstrates, will actively and consistently seek to encourage and develop the merits which are dormant.

One of the most effective means of bringing about this type of personnel management is to appraise the performance of personnel, to take an inventory of human resources, to find out just what those resources are and how best to utillize them.

Systematic Personnel Appraisal.—The appraisal of subordinates in industry is not something new. What is compartively new is the attempt to arrange systematic appraisals.

Performance appraisals help supervisors to know their subordinates better, the subordinate to know himself and his performance better, and the supervisor to know himself and his performance better. Some of the ways that systematic appraisals can help are (a) in decisions concerning promotions, transfers, etc., (b) individual progress will be assisted, (c) individual talents will be uncovered, (d) individual weaknesses will be discovered to enable correction, (e) in salary administration, and (f) to discover training needs.

Personnel, of course, refers to management as well as to nonmanagement. System-wide performance appraisals on the Canadain National started with management. The responsibility for the proper management of employees rests with their supervisors.

Appraising supervisors at the start helps to insure that present and future management is competent. It starts development where it is most effective. Supervisors influence their subordinates. Appraisals must be accepted in the proper spirit by all concerned if they are to be effective. They should start from the top of the organization and proceed downward.

The Canadian National's method, along with other performance appraisal or merit-rating procedures, is far from perfect. However, even an imperfect appraisal can, if properly used, form the basis of effective personnel management. It can help a supervisor to manage his subordinates more effectively.

The immediate supervisor and two other persons who best know the employee to be appraised will systematically consider his work performance and record their opinions on forms provided by the Personnel Department. Then the appraisal will be the basis of discussion between the employee appraised and his immediate supervisor and the appraisal interview and recommendations which emerge from it are reviewed by higher management. The plan calls for these appraisals on an annual basis.

Technique of Appraisals.—The committee of three should, wherever possible, be senior in status to the person to be appraised. They should be the three people (including the immediate supervisor of the employee) most familiar with the individual on his job. They must be acceptable both to higher management and to the person appraised.

The supervisor will normally be the leader of the committee. As leader, he will

need to guard against undue personal dominance of the committee. The committee will need to have the subordinate's responsibilities and duties clearly in mind. The prior study of an adequate job specification will provide this.

A guide has been prepared to assist the committee in the appraisal. They will examine what this employee has accomplished in measurable results under the broad headings of quantity and quality of work, and control of costs, etc. Following this, they will consider how this person goes about getting his job done, how does he work with and through people, by planning and organizing, getting along with others, delegating responsibilities and development of personnel under his guidance. They will consider what the employee's personal qualifications are as shown in his performance on his job, more particularly his knowledge of the job; his leadership. In addition, the committee will assess the initiative displayed by the employee, his dependability, his analytical ability and vision, and under the general heading "Vitality" they will discuss his energy and endurance.

Pitfalls.—Experience in performance appraisals to date has shown that there are some common pitfalls which, if not avoided, affect the appraisal adversely. One of these pitfalls is personal bias. As emotional creatures, we are prone to let our personel likes and dislikes affect our judgment to the detriment of impartial performance.

Another is the "halo effect." It is not true that a person who is very successful in his total job is necessarily successful in every particular aspect of it. Yet the tendency is to put a halo around every action of a good subordinate.

Opposite to the halo effect is the "hopeless case." We allow a certain failing or failings of a person to color our opinion unduly of his total achievements.

Incorrect standards are evident when one supervisor may demand too much of a subordinate and another may ask too little. Both weaknesses usually result in poor departmental morale, especially where the two supervisors work under the same salary structure, promotion arrangements, etc.

Here are a few suggestions which have emerged as a result of our meager experience up to this point. An appraiser should always be completely frank with the rest of the committee about the reasons for his opinions concerning the employee being appraised. Above all, he should adopt the helpful, rather than the critical, approach; to effect improvement, rather than to merely criticize.

The Interview Following Appraisal.—Once the appraisal is completed, it is the responsibility of the supervisor to interview the employee as soon as possible, with the details of the appraisal before them on the table. Considerable thought has been given to the procedure to be followed in this interview. To assist those conducting the interviews, a manual was prepared highlighting some of the things to be avoided and suggesting ways and means of giving the employee all possible means of assistance for his improvement and to encourage him to suggest ways and means of improving himself.

Review of these interviews has disclosed special areas where additional training seemed to be warranted.

During the annual interview after appraisal it is possible for the supervisor to inform the employee just where he fits into the salary bracket for his job. The job evaluation procedure used on the Canadian National (for non-scheduled jobs only) provides a minimum standard and maximum rate for each job. Normally, a man who is measured against the job specifications and is found by appraisal to be performing at a satisfactory level would be entitled to the standard or job rate for that level of work. Normally, his progress from the minimum to the standard rate would be in successive steps. Nevertheless, employees are urged to increase and improve their level of performance in the job so that those who are rated as doing more than a satisfactory job may qualify for some increase above the standard nearing the maximum for the position.

There is nothing quite so frustrating as for a man to start out on a new job full of enthusiasm and, after putting all of the energy he commands into his work, to receive little encouragement and no monetary reward or encouraging recognition. It is one of the most morale damaging shortcomings of many large industrial companies and railroads.

What the Executive Wants.—Top executive must, of necessity, concern themselves primarily with the personal growth of individuals on their immediate staffs and delegate to others down the line much of the responsibility for developing management personnel in the subordinate ranks. They want assurance that the development of management and executive talent is at all times integrated with the immediate and projected needs of the system, both as to numbers and specific qualifications. Assurances can best be provided through a carefully planned, systematic and continuing program of management inventory and development. Performance appraisal is the genesis of such an undertaking.

F-M Improves Its Locomotives

Under the title of "A Progress Report," C. H. Morse, Jr., service, manager, Railroad Division, Fairbanks, Morse & Co., described eight recent improvements in the opposed-piston engine and in electrical, auxiliary and control equipment. He also presented a brief description of the Fairbanks-Morse "Train Master" locomotive.* The improvements are summarized below.

Explosion-Proof Crankcase Covers.—The top covers are now held by capscrews which are not only larger in size, but also double in number. The covers over the openings in the lower crankcase are now clamped securely. The covers will now withstand the pressure induced by the initial stage of a crankcase explosion and so will not allow air to enter the crankcase, which will furnish oxygen for a second and more violent explosion. At no time during the tests were any covers loosened, nor have any covers come off in service on engines of this type, although instances of failure of other engine parts must have caused unnoticed crankcase explosions.

Crankcase Protection Switch.—This device, manufactured by Paxton-Mitchell, is mounted on the vertical-drive inspection plate cover. It functions to shut down the engine when the crankcase pressure (normally below atmosphere because it is being exhausted by a connection to the suction side of the blower) rises slightly above atmospheric pressure. Examples are a cracked piston or a pressure surge if a hot bearing ignites the oil vapor in the crankcase.

Chrome-Plated Cylinder Liners.—Tests indicate that the life of the liners will be considerably prolonged, perhaps to the extent of being tripled in road service. Other liner changes include the omission of fins and of two holes in the liner which were formerly fitted with dummy plugs.

The lead of the lower crankshaft has been changed from 12 to 15 deg. The change in timing of the liner port opening has reduced carboning and the maintenance time required for its removal.

Heavier-Walled Pistons with Improved Cooling.—Increased wall thickness strengthens the piston. The outlet for the piston cooling oil, formerly at the skirt end of the piston insert, is now near the top of the insert. Oil is trapped in the piston and thrown against the inside of the crown when the piston reverses direction at the inner dead center. This "cocktail shaker" promotes cooling of the crown.

Light-Weight Connecting Rods—Connecting-rod caps have been materially reduced in weight. Ample in strength, they have a beneficial effect on bearing loading.

Counterweighted Crankshafts.—Result in greatly improved main-bearing loading. A torsional damper is now used on the upper shafts of the twelve-cylinder engines. The lower shafts are so equipped in all engines sizes.

Aluminum Main Bearings, both radial and thrust, are now used. Connecting-rod bearings and camshaft bearings are also aluminum. Some aluminum main bearings are still operating with upwards of million miles of service. This is partially attributable to a change in oil filtration.

* For a description of the Fairbanks-Morse "Train Master" locomotive, see *Railway Mechanical and Electrical Engineer* for December 1952, page 59.

The Pintle Type Nozzle is a small replaceable unit. It provides full atomization of the fuel even at engine idling speeds. Dilution of the crankcase oil is now no problem. A nozzle is seldom condemned because of improper popping pressures, but rather for such defects as sticking or leakage at the pintle seat. Half of the nozzle with these defects can be reclaimed in the railroads' own shops at a small expense. When one must be discarded, the cost of its replacement is less than a "repair and return" of a conventional injection nozzle.

Combined Filtration and Straining of Lubricating Oil.—The outside circulating system for the lubricating oil contains a by-pass filter which handles 20 to 40 per cent of the oil flow; all oil passes through a large strainer with a 0.003 to 0.004 mesh.

Cooling-Water Temperature Control.—The thermostat of the electro-pneumatic Minneapolis-Honeywell system is, essentially, a temperature-operated air-reducing valve. As the temperature of the cooling water rises, the thermostat allows air pressure to build up on its outlet side. The rising air pressure successively closes switches in the step controller which energize first the shutter magnet valve and then contactors to bring in the fans one by one. The temperature rise required to close the last switch, after the first one operates, is 10 to 12 deg, so the cooling water temperature normally remains within this range. The bracket of temperatures can be moved up or down by a simple adjustment at the thermostat. Air pressures do not change with change of thermostat setting.

Electrical Rotating Equipment.—The Westinghouse 370 traction motor has a continuous rating of 1,020 amp, but can be run at 1,150 amp for 10 min. This produces nearly 20 per cent additional tractive force.

Similar improvements in insulation of auxiliary motors give them longer life and more reliability.

The Bias Type Ground Relay is more sensitive in detecting grounds and, hence, more efficient in forestalling trouble from this source.

The Impulse Type Surge Relay acts to prevent flashovers or, if they do occur, to minimize their effects. It is operated by any sudden change in the current flow, not by the current values themselves. Reset the relay and continue the locomotive operation.

Transition and Field Shunting Control.—Field shunting and transition are initial at predetermined locomotive speeds on the "Train Master" and general service locomotive units with six motors. With Westinghouse equipment, the signals for the changes are given by a Justus Control Company speed shunter which actuates a Westinghouse cam controller which rotates to open and close contacts producing the transition sequence. The two devices give positive control and smooth transition.

Hump Control.—With this device, the power of a locomotive can be very gradually reduced to keep the speed constant as cars are cut off in a humping operation. Conversely, it can be used to apply power slowly when starting a train and so minimize wheel slipping.

Dual-Circuit Dynamic-Brake Control.—Units with the field-loop type of dynamic braking control would not MU in dynamic braking with units using General Electric load control, and vice versa. With a dual-circuit control, which can now be furnished, a leading Fairbanks-Morse unit can control the dynamic braking in a trailing unit employing either type of braking.

Train Radio Communications

"How far can I talk on the train radio?" "Why can I talk farther at certain places and times of day than I can at other places and times?" To answer these questions is not too difficult, according to M. R. Beamer, superintendent communications, Texas & Pacific, in his paper on Train Radio Communication, if the radio wave path is considered to be similar to a path of light. Long distances may be spanned if no interfering objects, such as hills, trees, buildings, etc, intervene. Base station radios generally have higher antenna structures, therefore. their range is greatly extended over that of a mobile station. The radio waves can be reflected by certain objects and weather conditions. These areas cannot be predicted but, along with shielded areas, become known by experience.

Another phenomenon affecting train radio is a temperature inversion. This is a layer of warm and cold atmosphere having a very sharp dividing line between them somewhere above the earth's surface. This condition acts as a nearly perfect reflecting surface for the radio waves. This phenomenon cannot be predicted.

Mobile stations in railroad service should expect from four to ten miles range to another mobile station and from eight to twenty-five miles range to a base station. The range increases as the antenna elevation increases.

Frequency modulation receivers have a characteristic noise level which is inherent in the receiver. If a received signal is noisy and hard to understand, then there is not enough signal strength for the receiver, the radio path is too long, or it is being interfered with by intervening objects, or possibly the receiver or transmitter needs attention.

To avoid obnoxious noise during periods of no radio signal the receiver has been equipped with a squelch circuit which, in effect, removes the loudspeaker when it is not needed. The squelch does not release immediately with the energizing signal; this accounts for clipping the first part of a word of a transmission if the operator speaks too soon, and for the tail of noise at the end of each transmission.

The transmitters, by law, are restricted to a fixed maximum of audio power. The installer and maintainer should both be considered in locating the radio equipment. It usually evolves that the most convenient location for the installer is also the best maintenancewise. The Electro Motive F-7 freight unit, without a steam generator has an ideal spot for the radio at the left rear corner. Disadvantages are its distance from the battery requiring long heavy primary power wires to the radio equipment, and the radio equipment is not entirely protected from damage caused by diesel mechanics using the radio as a work bench. Front end, or nose, installations are the more common.

Caboose radio equipment should be placed in a cabinet or locker under a seat. No other use should be made of the radio compartment. Wood screws should not be relied on to hold the heavy radio equipment in place, it should be bolted down. The caboose antenna should be placed at the highest point on the car. If the caboose is wood a large metal plate should be mounted under the antenna to improve the radiation pattern.

A minimum of flexible conduit should be used in mobile radio installations. When used it should be well anchored to eliminate chafing wire installation. All wires should be terminated with pressure lugs which grip the wire insulation as well as the wire and lock washers used under the screw heads at the terminals. The radio energy is fed to the antenna by way of a coaxial cable. It can cause trouble and loss of energy if bent on too small a radius.

Life of certain parts of the radio system can be shortened if operated at reduced voltages even for short periods. It should be turned off during the engine starting interval. Manual starting is not foolproof; the automatic method is best.

There are various ideas for powering the radio sets on railroad equipment. Some thought should be given the prime power conversion question before making a decision on the type. If radios are purchased for each voltage, then two and possibly three types power supplies will be needed, one for caboose, another for locomotives, and a third for base station. The Texas & Pacific chose radios all having 117-volt ac power supplies, and converts the prime dc voltages to 117 volts ac. This eliminates carrying spare radios for each voltage, and eliminates various dc testing voltages in the maintenance shop. The 117 volts ac is derived from a vibrator converter on cabooses and locomotives.

Rotary converters are very good devices for furnishing power to the radio. Original cost is higher, but maintenance cost is lower.

The Federal Communications Commission has established certain laws covering railroad radio. These laws must be complied with, and are known as Part 16—

Land Transportation Radio Services of the FCC and may be secured from the Commission's offices in Washington D. C.

Some adjustments on a railroad radio transmitter must be made by a licensed radio operator. It is legal to contract railroad radio maintenance provided the contractor has properly licensed personnel. Usually, the radios are locked or sealed to keep unlicensed personnel from making adjustments. Most locomotive engineers will report trouble in the Engineer's Inspection Report. If fuses or prime power have failed, usually the electrician can make repairs. If the trouble is within the radio, then the licensed radio maintainer should be notified by the mechanical forces. Caboose radio trouble will usually be reported by the conductor by wire direct to the radio maintainer, with a copy of the report to the master mechanic. Some radio trouble is not reported, therefore, periodic checks of all radio equipment in a terminal should be made throughout the day. Most radio shops have a radio set turned on at all times, and it is helpful in locating bad radios to have the electricians call into the radio shop for a test from each locomotive and caboose they have occasion to be on.

Loss and Damage Due to Overspeed Impact

In his paper on the subject of loss and damage due to overspeed impact, C. A. Naffziger, director of the Freight Loss and Damage Prevention Section, AAR, defined overspeed impact as any impact at a speed above which the draft gear is closed. As a result of tests and experiments, he said that it had been found that the limit of absorption of the draft gear on the majority of cars in service today is 4 mph, and that this has become recognized as the maximum safe coupling speed.

The National Freight Loss and Damage Prevention Committee has endorsed 4 mph as the maximum safe coupling speed as have the vast majority of the railroads. In fact, the Uniform Code of Operating Rules carries the provision "Make all couplings at speeds not greater than 4 mph."

Mr. Naffziger explained that overspeed impact is one result of kinetic energy, or energy of motion, and is equal to half the mass, multiplied by the velocity squared, and that there is a terrific build-up in the destructive effect as speed is increased. For comparison, it is only necessary to square the speed at the moment of impact to determine the units of destructive force.

As an example, an impact speed of 5 mph has 25 units of destruction. Thus, it can be seen how rapidly the capacity of the draft gear is reached and exceeded and how important it is that coupling speed be kept below the recommended limits.

Tracks, grades, curves, leads, switches, cars, in fact the entire physical plant must be studied to effect necessary changes which will make the control exercised by railroad men more effective. For example, it means little if a grade is such that a car, cut off at safe speed, gains momentum to the extent that it strikes another car with damaging effect. The men quickly recognize such situations and their prompt correction will reflect the interest of management in the promotion of programs to reduce and prevent overspeed impact.

Careful Car Handling.—The key to the entire careful handling program is to secure the build up of interest of men on the ground who are actually handling the cars. That is where the damage from overspeed impact is occurring and that is where it must be corrected.

Virtually every carrier has a program to promote careful car handling. Yards and other equipment are continually being improved and the careful-car-handling story is being taken to the men through meetings, discussions, photographs, bulletins, circulars, posters, motion pictures, demonstrations, technical press, and other means.

Several carriers have built special instruction cars, mobile class rooms, in order to present the story under the best conditions. Still other carriers have constructed specially designed demonstration cars, with plexiglas sides or with sides removed so that spectators may actually see what happens to the freight inside the cars when impacted at various speeds.

The freight loss-and-damage-prevention section has a special committee studying the overspeed impact situation and is continuously seeking new ways and means to promote careful car handling.

At each quarterly seminar conducted by the section on the proper preparation of freight for shipment and the loading and bracing of freight in cars, one entire day is devoted to impact tests with loaded cars switched on the test track immediately adjacent to the container and loading research and development laboratory.

Individual carriers as well as this section and quite a few shippers make use of impact registers to check the overspeed impact situation. In a recent study it was developed that 209 railroads own and operate 2,061 registers and have 161 additional machines on order. Shippers own and operate about 500 such units.

Perfect Shipping—We are all familiar with the perfect shipping campaign conducted throughout the year and intensified in April in each shipper's advisory board territory. Similarly, last October was declared as careful-car-handling month with a greatly intensified campaign program.

The campaign will similarly be intensified in October this year and in each year in the future. Thus, there is a continual year-around program for the promotion of careful car handling.

As a vehicle to carry the program to everyone and especially to the men on the ground who are actually handling the cars, a careful car handling committee has been formed in each shippers advisory board territory with the Chairman of the railroad contact committee (who is a railroad operating official) serving as Chairman of the careful car handling committee.

While it is evident that the prevention of overspeed impact presents a serious problem and a definite challenge to American Railroads, it is also quite evident that the railroads have accepted the challenge and are making definite and constructive steps to meet and overcome the situation.

While much has been done, there is still much more to do. All must become more active on the careful-car-handling team.

Air Brake

Papers Discussed at Regional Meetings

An increasingly popular method of bringing the problems of a specific group to nationwide attention

C. V. Miller
President

L. Wilcox
Sec.-Treas.

PRESENTATION, either orally or in writing, is but the first step in giving a group the maximum benefit to be obtained from a report. Going over the report during a period of discussion serves to emphasize and drive home the more important points in the report; it also adds to the scope by bringing in fresh thinking and new ideas; and finally it provides the means needed for challenging contentions that may first appear sound but do not stand up under more exhaustive scrutiny or more widespread experience.

The Air Brake Association did the second best thing in arranging for such an interchange of thought. They could not do the best thing as there was no meeting of the entire membership. What they did was to arrange to have the different papers prepared during the year read and discussed at different air brake clubs throughout the country, and this discussion will appear in the association's proceedings.

The association also retained its present officers and executive committee without change. At a meeting of the latter on September 8, twelve papers were accepted, abstracts of some of which follow.

Air Brake Parts Get A System of Identification

To help maintenance and stores personnel to acquire quickly a familiarity with 14-EL, 6DS, 6-SL, and 24-RL diesel brake equipment parts, an identification system has been evolved which connects up the locomotive unit in question, the component to be replaced, the correct piece number of the component, and the parts manufacturer's parts catalog reference in case a detailed breakdown of the component is required.

The system can be illustrated by taking five sub-classes of locomotive units having 24-RL equipment. A schematic piping diagram is prepared covering 24-RL equipment generally, and so that this can be included within the covers of the parts catalog it is split up into six diagrams on four pages. (These diagrams are termed Fig. 1-6. Space permits the inclusion of only a portion of Fig. 1 with this abstract.—EDITOR.)

Each major replaceable component—as well as some minor separate parts for illustrative purposes—is given a reference number (termed item number in the report). The assignment of item numbers, which can be done by any scheme desired, provides the key to a table of piece numbers. (Only a few of the items, which in the table are numbered consecutively from 1 to 109, are included with this abstract—EDITOR.)

The tabulation covers five different types of units—one B and four A units, with two of the A units passenger and two freight types. All 24-RL-equipped road units on one railway can be tabulated together, but a separate set of diagrams and tables is recommended for 6-DS and 6-SL equipment.

How To Use The Table—Of the many ways to use this parts identification system, the most straightforward is in ascertaining the correct piece number of a component for requisitioning a replacement. If, for example, a Rotair valve is to be changed out on a unit classified DFA-15a on the roster, a glance at the piping diagram will show the item number as 22. Looking up No. 22 in the piece number tables for class DFA-15a units shows the piece number to be 527415. Additionally, the appropriate Westinghouse parts catalog is listed as 3207-Sup.3, so that if any detail part of this rotair valve requires changing, the breakdown is available in the parts catalog shown.

Another example of how this system can be useful could be a district storekeeper who received a rush request from an intermediate terminal for an automatic brake valve for given locomotive. By looking up item 1 on the piece number table, under the column giving the class of that locomotive, the storekeeper can ascertain the correct brake valve without having to call on an air brake expert to identify the valve required.

Inventory Simplification—In setting up a stock of spare parts, the tables can be used to ascertain the number of compon-

BRAKE EQUIPMENT PARTS IDENTIFICATION AND INDEX

Ref. No.	Name of Part	Parts Mfr's Catalog Section	Locomotive Class DFA-15a	DFB-15a	DPA-22a	WPA-22x	NFA-15x
1	Brake valve	3208–13	529055	*	529055	523836	524412
	(automatic) Type		DS-24	*	DS-24	DSE-24-H	DS-24-H
2	Feed valve	3209–2–S3	537402–0070	*	537402–0090	537402–0110	537402–0110
21	Check valve	3216–24	520501	*	520501	520501	520501
22	Rotair valve	3207–S3	527415	*	531441	531441	531441
	Type		K–2–A	*	K–2–A	K–2–A	K–2–A
23	1st suppression res.		901386	*	900055	900055	*
107	Reservoir	3206–1	96997	96997	97142	97142	97142
108	Compressor	3203–1	529056	529056	8160304 x	816034 x	8163407 x
	Type		3–CDB	3–CDB	ABO	ABO	WX08008
109	Air gage	3216–7	527966	527966	515424	515424	515424

* Not provided.
x Builders pc. nos.

ents used on a given class of locomotives, and the extent to which the components are interchangeable with the corresponding parts on locomotives of another class. This feature can be particularly useful where the identification system is expanded to include locomotive types having other than 24-RL brake equipment. The charts can also be helpful for instruction and trouble shooting.

A further step which has been proposed but not yet carried out is to provide a numerical index of air brake piece numbers, probably not exceeding in scope the piece numbers in the tables. This would have a certain cross-reference value in giving access to the appropriate parts catalog number or, through item number, to the location on the piping diagram.

The chief benefits of this system, however, are in saving time and preventing perhaps costly errors in identification. It can be applied to almost any parts system where multiplicity of component parts and classifications of units tend to create confusion or lead to mistakes in indentification.

This report was compiled by The Montreal Air Brake Club.

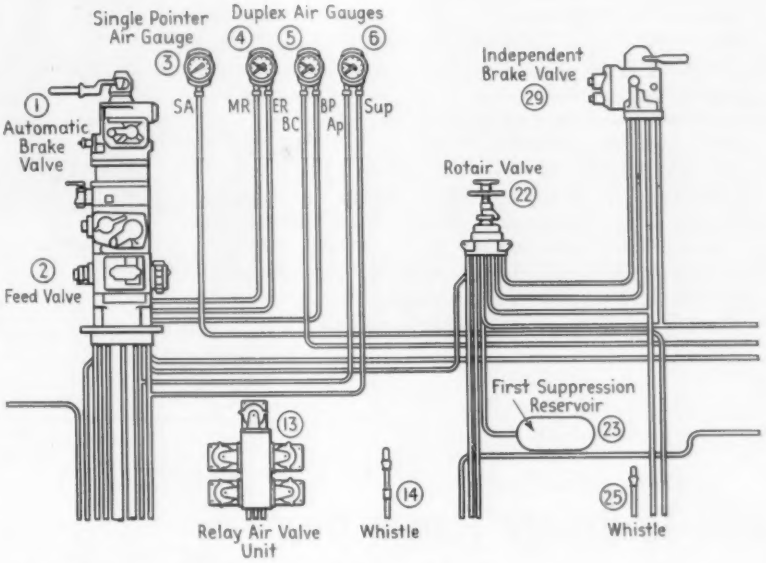


Diagram of the method of identifying air brake parts

Standardization of Air Brake Equipment

Moisture, oil and residue collected in sumps from radiation should be drained by some type of automatic drain valve, preferably one actuated by the compressor unloader. The drain valves should be of the gravity type whether automatic or manual, rather than a syphon from the reservoir or sump to the drain valve.

The present system of collecting and draining the moisture from the compressed air on diesels is inadequate. The air intake for the compressors on some diesels should be taken from a point or area outside the engine room. This is because the air compressor is located near the supercharger where the surrounding air is the hottest; also the gases from a leaky exhaust manifold can be drawn into the compressor, and discharged into the air line. As a result, such fumes of burned oil and gases coming from the brake valve have been reported so strong in the cab when braking that the windows had to be opened to relieve the odor.

The compressor discharge pipe to the No. 1 main reservoir should be not less than two inches in diameter, and it should be removed and cleaned when the main reservoir is given hammer test or inspection.

Cab Arrangements—The subject of air gages will be pressed to impress the builders that the lighting and location of the gages is very important. The brake pipe—brake cylinder and equalizing reservoir—main reservoir gages should be 5 in. diameter for easy reading of the calibrations.

It was recommended in 1953 that the rotair valve be located in the cab to eliminate the lost motion between the valve stem and the pointer of the extended handle as the lost motion could cause a false indication of the rotair valve position. This recommendation was modified to permit locating the rotair valve outside the cab if all lost motion between the extension handle and the valve stem is eliminated.

The instrument panel should have a space for the brake pipe flow indicator since this important device is being universally adopted. The dial and lamp should be in full view of the engineman and not obscured by the brake valve handle or other appurtenances. The warning light is essential.

Emergency brake valves on the fireman's side of the cab should be uniform in operation; the valve opened by pulling rather than pushing the handle, and the valve painted red.

The dead engine fixture on A units

(Continued on page 126)

Reclamation and Diesel Maintenance

LMOA experiments, for second year, with "pre-convention" presentations which bring out the real meat of subjects

SEVEN COMMITTEES composed of a total of over a hundred members developed reports on truck maintenance; rewiring of locomotives; reclamation; running electrical repairs; training of personnel; shop practices and the planning of diesel locomotive shops. Abstracts of some of these reports appear in this section, one on rewiring in the electrical section of this issue and others will be treated in subsequent issues.

The LMOA has, for two years, followed the practice of presenting the original of these reports at regional meetings, from the discussion of which the final report is revised before presentation at the annual meeting. These developed over 400 pages of transcript which will appear in the 1954 LMOA Proceedings.

The officers of the association hold over to 1955.

C. M. Lipscomb, Sec.-Treas.

F. D. Sineath, President

How To Reduce Flange Wear

In the interest of simplicity, this subject has been divided into two categories: "General Truck Maintenance" and "Methods of Reducing Flange Wear."

General Truck Maintenance—The truck is the foundation of the diesel locomotive. It is relatively simple in construction and can operate in a dilapidated condition. Maximum service can be obtained when the truck is left in a unit until the greatest amount of tread wear or flange height necessitates removal.

To insure proper maintenance it is essential that extra trucks, wheels, traction motors, boxes, etc., be available, so that spare trucks can be built in advance and change-outs made, as necessary, keeping the unit's availability at a maximum.

It has been reported to this committee that ordinarily a diesel wheel will run at least 100,000 miles before having to be removed for any reason. Mileage will differ greatly on railroads, due to physical characteristics of the road bed such as straight tracks, curves, mountain roads, river beds, tunnels, and the use of sand. Sand causes extra wear, especially where rail oilers are used.

It is good practice, when a truck is removed for any cause, to give attention to brake rigging, hangers, pins, and bushings. Mileage obtained from diesel trucks is approximately 290,000 miles with a general overhaul. It should wear out a new pair of wheels. Mileage obtained from passenger trucks is approximately 300,000 miles with only minor repairs such as pedestal liners, etc.

Truck bolsters require little attention other than to degrease them and inspect for cracks and defects when removed. It is considered standard practice to keep the female center plates on the bolster well lubricated in order to prevent excessive wear.

Each time an equalizer is removed, rebuilding of the worn surface on boxes is recommended. A saving is realized when inspection reveals the wear plates on the boxes are loose and repairs made at once. Furthermore, worn equalizers should be built up by welding and normalized to eliminate stresses.

Journal box wear in the pedestal jaw and wear on the jaw liner can be kept at a minimum by reducing the amount of separation between the pinion and ring gear and the pounding action of the box when under torque pressure. Do not lubricate pedestal jaw liners as they will accumulate road dust and grit and cause excessive wear. One railroad has reported that they have been using dry graphite for this purpose.

All brake hangers, spring hangers and pin bushings should be checked to see that tolerances are not exceeded. All portions of the frame that can be handled by magnafluxing should be given thorough inspection and necessary repairs made when located. Particular attention should be given to the pedestal leg bolt holes to prevent excessive wear on the pedestal shoe liner.

Truck maintenance and heavy repair should be performed in a building separated from other diesel maintenance due to the amount of debris that accumulates on the trucks. At the time of heavy repair and after a thorough cleaning, finished painting should be applied.

Reducing Flange Wear—The three most common causes of unequal flange wear are: improperly spaced wheels; truck frames out of alignment; and unequal wear in pedestal and box liners. It is particularly important that supervisors note the general condition of the truck immediately after its removal. At this time, before the truck is dismantled, he will be able to tell

whether or not it is running true and the flanges are wearing evenly.

As for improperly spaced wheels, just keeping a pair of wheels on the axle with no perscribed limits will not get the job done. Definite measurements should be set-up both in machining and spacing. An important phase in mounting diesel wheels, concerns the location of the ring or driving gear. When a wheel is received from the manufacturer, the inner rim is completely finished. Using this as a starting point, it is a simple operation to check from the outside hub face to the end of the axle for proper spacing. It is also very important to standardize back-to-back measurements. Wheels, of course, should be checked and matched within ¼ in. of tape size.

Generally speaking, truck frames are seldom out of alignment. Occassionally they are due to derailments and collisions. Usually, it is necessary to apply only a small amount of heat to pull a truck into alignment, while the parts are securely clamped in place. The affected areas should be thoroughly heated to relieve strain, then covered with heavy asbestos paper and allowed to cool as slowly as possible. One of the most important features in truck alignment is the renewal of pedestal liners.

When a truck is removed and the wheels show indictaions of unequal flange wear, it is good practice to tram the truck. Ordinarily, this condition can be corrected by clamping the truck frame to a large face plate and by use of jacks, blocking and heating torches.

Renewal of wear plates on roller bearing journal boxes, in order to maintain a standard size is one of the most difficult features in overhauling trucks. The box should be removed from the wheel, Hyatt bearings cleaned and each roller inspected for cracks or shelled-out spots. The outer race in the journal box should also be inspected for shelled places. Small shell-outs can be ground out easily if they are located in the lower portion of the box. The same procedures can be followed on Timken bearings.

While the journal boxes are removed, wear plates can be melted off by the use of proper type electrode and reversing the polarity of the welding machine. In order to avoid excessive heat, the boxes are set up in groups and the welder will melt but a very short space on each box, never developing enough heat at any one time. In applying new plates, they should be welded progressively in the same manner. Control of heat is a *must.*

There are very few wearing surfaces on a diesel truck that cannot be restored by renewing a wear plate, pin or bushing. There are some parts, such as equalizer seats, which can be restored by welding, providing proper attention is given to annealing.

If brake rigging is neglected, it could permit the brake shoe to be out of perfect alignment with the wheel and allow it to extend over the rim. This is likely to cause thermal cracks in the wheel.

After a truck has been overhauled in this manner and placed back in service and kept lubricated and clean so that it can be inspected each trip, very little trouble should develop from a running repair standpoint.

A careful study of wheel life, under varying conditions has revealed that if maximum wheel life is to be attained, special attention must be given to the following: operation such as braking; full use of dynamic brake; excessive speed on curves, which causes flange wear; the use of sand, a good cutting agent, should be kept at a minimum; and the elimination of unnecessary slipping to increase the life of wheels.

This is an abstract of the Shop Practices Report on Diesel Truck Maintenance and Methods of Reducing Flange Wear of which O. L. Hope, Mechanical Superintendent, Missouri Pacific Railroad is Chairman.

Planning the Diesel Shop

Diesel operation and maintenance has been with the American railroads for about twenty years. Because of the manifold problems, this topic has been divided into two main sections: Forecasting, Requisitioning, Control and Material Handling Layouts.

Forecasting, Requisitioning and Control—One of the most difficult problems in diesel maintenance is that of having the required material on hand when needed. Under ideal conditions, all material should arrive from the manufacturer when it is needed and in desired quantity.

Ideal conditions can rarely be realized. Usually a considerable amount of stock must be carried in a central store, allocated to section stores in order to equalize variations between the loco-maintenance terminal and source of supply.

In considering what stock of material should be carried at various locations for maintenance, the following considerations should be observed:

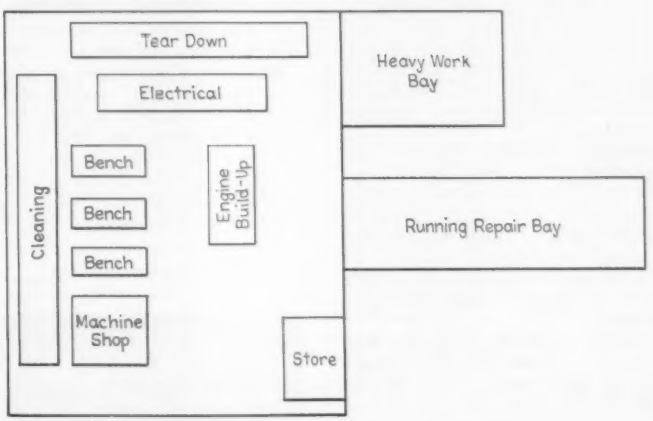


Fig. 1

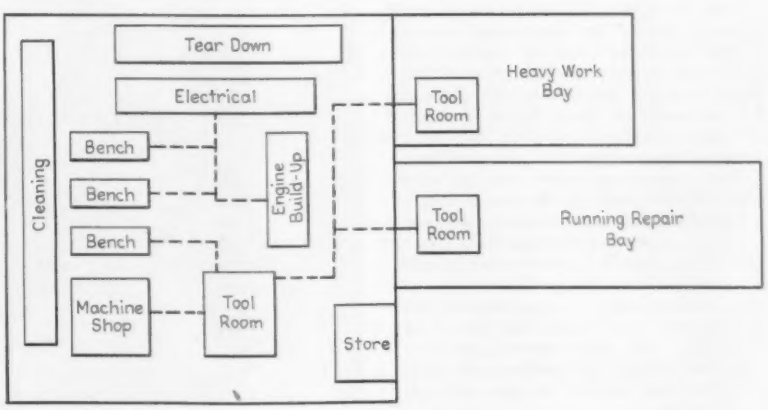


Fig. 2

1. Demand for particular part or combination of parts.
2. Saving that may be effected by purchasing in quantity.
3. Interest on investment tied up in materials, storage facilities, labor costs of keeping inventory.
4. Time required to obtain material and prepare for maintenance.
5. Probability of improved design and consequent depreciation through overstocking of parts.

Because of the above mentioned considerations, this committee is recommending the assignment of a position or positions that would be responsible for coordinating material procurement and control. The advantages of a well organized department could prevent unauthorized overstocking of valuable material; waste due to excessive material withdrawal; losses due to unaccounting of valuable material; discarding of worn parts that are reclaimable; scrap for which credits are never obtained; and out-of-proportion operating ratios due to excessive out-of-service time because stocks are not available.

The principal assignment of this procurement department would be to anticipate needs of the shops and terminals in the most effective and economical manner. In order to fulfill this, it must be accomplished in the following manner or recommendations.

1. Hold regular material and procurement control meetings with officers representing mechanical, purchasing, stores, manufacturers and suppliers representatives.
2. Establish material standards and quantities for every-day maintenance; classified light shop repairs; classified intermediate shop repairs; heavy or general overhaul shop repairs; and improvement of special programs.
3. Develop and recommend material and delivery dates for modification programs.
4. Maintain service life records and cost references of new material, arrange for substitute products and reclaim parts by job shops, etc.
5. Control material requisitions issued by maintenance departments to avoid excessive inventories.

With the advent of dieselization, the importance of time has accelerated due to greater need for material control and utilization. Because of the variety of material required, the question of quantity has increased and is no longer a simple one that can be decided by the gang foreman, shop supervisor or stockman.

The economic principles that underlie standardization with its advantages are:

1. Reduction of inventories of fixed types, sizes, and characteristics, eliminating so-called gadgets and substitutes as nearly as possible.
2. Establishment of interchangeability of manufactured parts and assemblies for old and newer types of power.
3. Establishment of standards of excellence and quality in parts and assemblies.

It is almost impossible to establish a system that would be suitable for all railroads. Each one requires close study in accordance with facilities, requirements, types of motive power, manpower policies, source of supply and the extent of unit exchange.

Material Handling Layouts—In the railroad industry, material handling adds no value to the product yet it adds 20 per cent or more to manufacturing costs. Because of the high cost, it becomes mandatory that it be made an integral part of the plant layout. Good material handling requires proper location of various departments, a logical sequence of operations and flow of work and a convenient location of store areas, tool cribs, tool rooms, etc.

Fig. 1 shows a theoretical centralized diesel repair shop. Note the three sections of the heavy work bay; running repair; and sub-assembly shop. In selecting the location of the main tool crib or room, some items of utmost importance must be considered.

The tool room should be conveniently located near the manufacturing area since demand from this area will be the heaviest. The department best befitting this description is the machine area where bushings, pins, shafts and other shop-made items are manufactured. It can also be seen that the machine shop is contained within the sub-assembly area from which tool room services such as check gauges, dies, taps, etc., will also be in demand.

By placing a central tool room near the machine shop which is contained within the sub-assembly area as shown in Fig. 2, a definite material and tool flow pattern can be set-up which will insure an even and non-conflicting supply of tools and materials. The supply lines are flexible enough to serve the sub-assembly area, but will become overstressed if they are required to serve the heavy bay or running repair shops. In order to alleviate this, a specialty crib has been established in each of the departments. These two cribs (Fig. 2), will contain only such special tools as required in their specific sections.

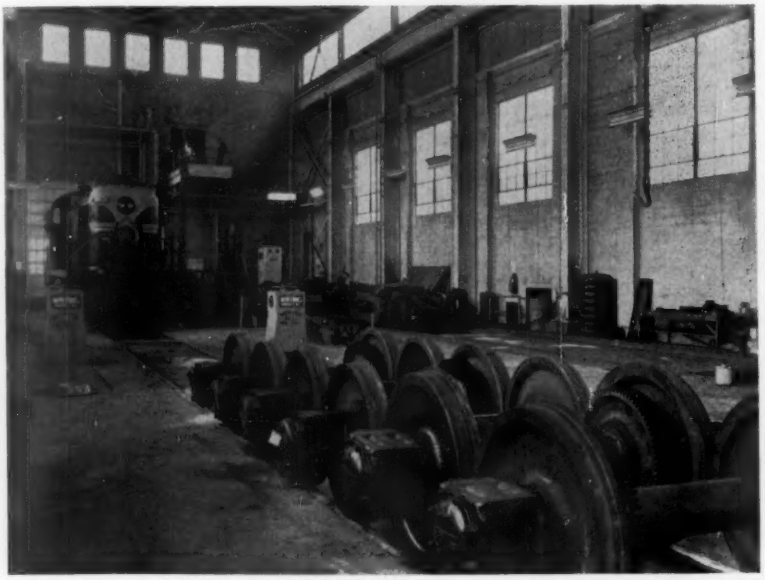
The second and perhaps the most important item to be considered in tool room planning is the design of a proper operating procedure. Through this medium, a proper materials handling program can be evolved.

The central control room must be large enough to handle the business volume in the sub-assembly area and any additional work brought in from the specialty sections. It should be able to provide the following services:

1. Adequate space for receiving, repair and storage of tools in an efficient manner.
2. Provide room for a testing section with project bench and equipment where tools, instruments, gauges, etc., can be calibrated and checked for accuracy.
3. A well-arranged filing and checking system to record tool life, etc.
4. Supervision on all shifts to control tools issued for everyday use.

Through newly developed techniques, services offered by the tool room will improve both the quality and quantity of work produced in the machine shop and sub-assembly areas.

This material was abstracted from the Shop Planning Committee Report on "Uniform Flow and Handling Material in a Centralized Diesel Shop". E. L. Neely, mechanical superintendent, Union Pacific was committee chairman.



The modern diesel shop is equipped to handle everything from wheels to locomotives.

Diesel Units Now Need Refinement

In this message to LMOA members ICC Commissioner Owen Clarke points out some of the things that operating experience, over a period of more than 20 years, has shown to be a need for changes in the diesel-electric locomotive

The advent of diesels was so sudden that railroad mechanical departments had little to say about the design or construction. During the years when steam locomotives predominated it was customary practice for larger railroads either to design locomotives as purchased or to cooperate with builders' engineers in order that each group of locomotives furnished would conform to established railroad standards.

The situation with respect to diesel power is some what reversed. Diesel units are constructed by each individual builder, on a mass production basis, in accordance with the organization's ideas of what constitutes the most desirable design both from the consideration of operating characteristics of individual components and from the viewpoint of plant equipment and facilities

The railroads, and particularly the mechanical departments, have thus been placed in the position of accepting a ready-made product with limited opportunity to specify features which experience or local operating conditions indicate as desirable or necessary. The initiative generally is taken by the builders. It appears that more coordination between the builders and the mechanical departments of the railroads would be desirable. The situation has led to a considerable amount of confusion and difficulty when dissimilar units are operated in multiple control.

Some features which have caused difficulty are:

1. Lack of control connections whereby all individual unit controls can be operated from the control cab of the leading unit in the same manner as when units are operated independently.

2. Inability to selectively operate sanding equipment on trailing units from the lead unit.

3. Lack of uniformity of braking action when units having 24-RL equipment are coupled to units having switching brake equipment which is not compatible with 24-RL road equipment.

4. Variance in passageway design which has resulted in differences in deck levels which in some cases were 12 or more inches. When we consider that the maximum difference in deck levels of tender and cab floor permitted under Rule 152 (prescribed for steam locomotives) is 1½ inches the difference in deck levels existing between diesel units is cause for concern.

5. Lack of uniformity in lengths of electrical connectors has created an operating hazard. Numerous instances have been found where connectors hung down in passageways to the extent that they interfered with the free movement of the men required to use the passageways.

Owen F. Clarke

At present we are working under rules formulated in 1925 when Diesel-electric locomotives were still in the experimental stage. Although the Diesel-electric unit has since undergone extensive changes and developments, these rules still govern. A change or revision of the rules, bringing them up to date, is needed. We are working on a set of rules with this objective in view. It is hoped that by the adoption of rules and standards more appropriate to this modern power and with the cooperation of the mechanical departments of the various railroads that better uniformity of construction and operation can be effected.

It is unfortunate that the wheel, which is the first mechanical invention of major important, should be a matter of great concern today. With the advent of the diesel the service demands imposed upon wheels materially increased. The high operating speeds, thermal stresses, heavy loading, shock loads resulting from rapid acceleration and sharp braking have resulted in a number of cracked and broken wheels.

Reports of diesel wheels that have failed to the extent that they could not be continued in service continue to be received at a fairly steady rate. It appears that the problem of cracked wheels under diesel units has not as yet been solved and therefore avoidance of accidents is dependent upon the thoroughness and frequency of diesel wheel inspections.

It may be in order to call to your attention that extensive cracks in diesel wheels usually result from a thermal check or a defect that acts as a stress raiser; that these cracks are almost always progressive in nature and develop over a period of time. While danger of disaster from a broken wheel is always with us, that danger may be minimized by adequate inspections. Wheel failures on diesel units have been responsible for two serious derailments involving fatalities and numerous casualties among employees and travelers.

Three serious derailments caused by locked traction motor pinions, resulting in fatalities and a large number of casualties, have also occurred. Failed traction motor bearings locked the pinions which in turn prevented rotation of the wheels. The sliding wheels developed large flat spots and false flanges which ultimately caused the derailments. These accidents emphasize the necessity for regular and thorough bearing inspection and maintenance.

Hand brakes were not generally used on steam locomotives. Chocking of wheels at terminals was the general practice. When diesel-electric units were in the process of development the use of a so-called "parking" brake which acted on one or two wheels became general practice. Apparently these parking brakes were intended to hold the unit when at a terminal and obviate the need for chocking.

Experience has indicated that, because of anti-friction bearings diesel units roll easier than steam locomotives and that the use of a substantial hand brake is desirable. Your Association may deem it advisable to consider the advisability of equipping units with hand brakes capable of stopping and holding a moving unit on a heavy down grade. In this connection I invite attention to tests of diesel-electric units equipped with hand brakes having minimum braking ratios in excess of the 25 per cent recently suggested by the Board of Transport Commissioners for Canada which demonstrated the possibility of stopping a free unit moving at a speed of approximately 25 mph on a 2 per cent descending grade by use of the hand brake alone.

Accidents have occurred when current front end construction did not prevent the entrance of inflammable liquids into the cab of the unit at the time of a collision with liquid carrying road vehicles. This matter also might merit consideration by your Association inasmuch as reinforced front end construction has been found necessary on units operating in Canada.

ELECTRICAL SECTION

Wheels Slip— Science Tells Why

Wide gage on curves causes slippery track.

By R. K. Allen

Exhaustive field and laboratory tests show that a thin film, propagated from grease by moisture, is responsible for much slippery track

The day had been warm, but late in the afternoon the sky clouded and a sudden coolness shrouded everything in damp mist. In the distance NJ-4 rumbled across the river. Passing the tower on the east bank, her diesel horns sounded clearly through the damp overcast. With a rhythmic exhaust of her engines, she moved slowly along the river, stretching out the 96-car drag of mixed lading with 5 heavy coal hoppers at the rear. As she rounded the curve the signal showed clear, and a deep throb echoed over the town as the engineman notched out on the throttle. Gradually the train speed increased until it reached 25 mph.

Now the tracks curved away from the river to begin the long climb up the mountain. Slowly the grade ate up that original momentum and the train speed settled at 12 mph on the nearly constant grade. The road bed hugged the side of the slope, and off to the left was a creek. Ahead the track curved to the right,—the beginning of an 8-degree reverse curve. The thunder of the three diesels echoed through the mountain air as they rounded the first curve. Entering the second curve the harmony was broken, once, twice, three times as the wheel-slip relay momentarily unloaded each unit in succession. By now the sanders were on full, but the slipping continued. The engineman was not surprised by wheel slip in this location, but this night it proved to be a presistently slippery stretch of track. He notched back, hoping that reduced tractive force would stop the wheel slip, but to no avail. The train speed began to drop,—10, 6, 3 mph—until it stalled within 800 yards. Several attempts were made to restart by easing back, sanding, and starting from the track previously covered. Each time the result was the same,—wheel slip. The diesel units stood helpless,—low adhesion prevented applying their mighty power to pulling the train.

If you ask train crews about conditions surrounding this phenomen, they will tell you that it occurs most often in cuts and shaded areas, and is especially frequent in fog and misty weather. The onset of rain is a very slippery time, but heavy continued rain gives good rail

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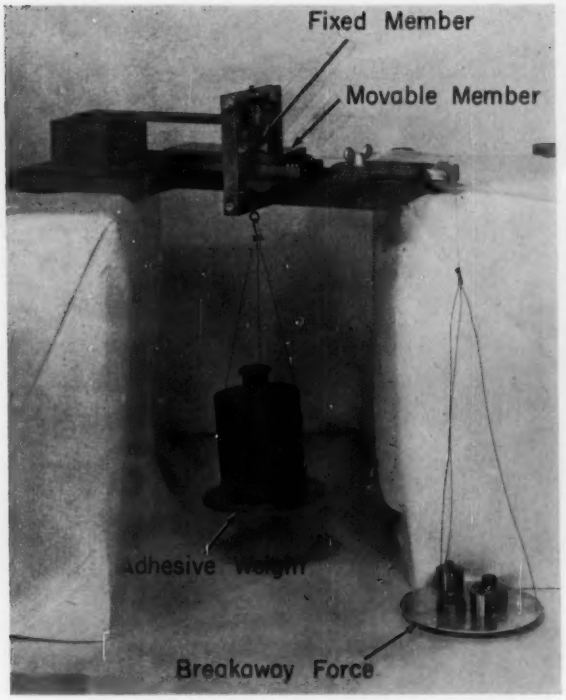
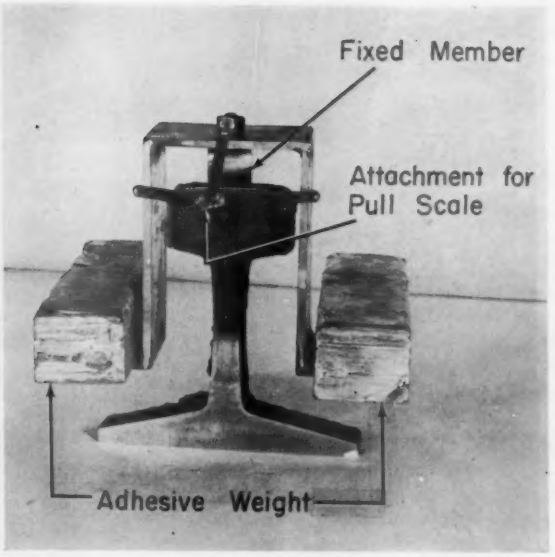


Equipment used for laboratory tests.



Modified laboratory device for measuring track adhesion.

traction. What is this seemingly anomolous behavior of nature?

This question confronted the railroads, and to a lesser degree, locomotive manufacturers. Actual adhesions developed by locomotives in the field have been measured as high as 42 per cent and as low as 12 per cent. What figure should be used? Common practice has selected the mean (25 to 30 per cent) as a design basis. However, equipment must be electrically and mechanically capable of short-time duty when higher adhesions are present. How often are they present? Railroads have been harassed by the wheel-slip problem. It has been responsible for much equipment damage and has definitely shortened rail life through the prevalence of track burns. Of more importance, experience has dictated that train tonnages be based on not over 16 to 18 per cent adhesion for dependable operation. This means incomplete utilization of motive power.

Laboratory Apparatus

To answer some of these questions an investigation was undertaken. It began in the laboratory with an attempt to duplicate rail and wheel adhesion with two steel test pieces. Calculations show that the maximum contact pressure between a rail and a 40-inch wheel with a conventional diesel axle loading (60,000 lb) varies from 70,000 psi to 100,000 psi, depending on the amount of rail and wheel wear. The shape of the contact area is also a function of wear. For a wheel that is worn half way to its first turning and a rail with half of its mainline life spent, the contact area is nearly rectangular. Its corners are rounded and it has a length along the rail approximately ⅓ of its width across the rail. The area of contact is between 0.4 sq. in. and 0.5 sq. in. The laboratory test apparatus, shown is one of the illustrations, was designed to stay as close to these actual conditions as possible.

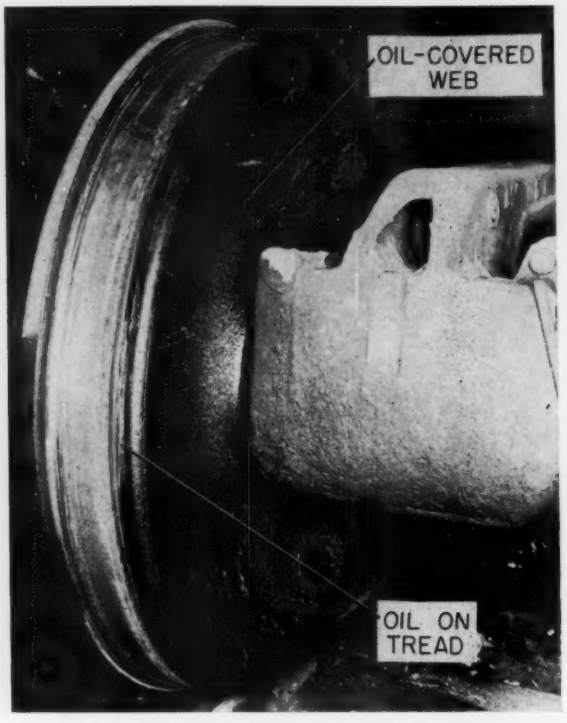
Essentially the equipment is a device for measuring the static or breakway coefficient of friction. One member is rigidly secured, barrel-shaped piece 1¼ in. in diameter with a 3½-in. transverse radius. This piece incorporates both the curvature of the wheel and the crown of the rail. The movable member is a 2-in. by 5-in. flat plate. The adhesive weight was placed on a pan attached to a knife edge which loaded the fixed member. The breakaway force was determined by adding weights to a pan that was attached to the moveable plate by a wire passing over a pulley. The test device was built to give 75,000 psi maximum contact pressure and an area shape factor of 3.12 to 1, when loaded to 12 lb. The two members of the device were machined from a section of 100-lb rail of approximately .70 carbon steel and testing 255 Brinnell hardness. The flat plate simulating the rail was left at this hardness. The barrel section was hardened to 300 Brinnell to bring it within A.R.E.A. specifications for Class A and B locomotive wheels.

Investigation of Films

The first efforts were directed toward determining the effects of rust films on adhesion. Rust films, varying from a mere trace to a deep reddish brown, were allowed to form on the flat test plate. None of them was found to be slippery. In general, the heavier the rust film the higher the adhesion. The conclusion reached was that the rust film did not withstand 75,000 psi and, therefore, was not the slippery element for which we were looking.

During and following the rust film investigation uniform breakaway adhesions could not be obtained when the test plate was in a supposedly clean and polished condition. The breakaway adhesion varied from 35 per cent to 10 per cent with no apparent difference in the plate surface. At first there seemed to be no good explanation of this phenomenon. Repeated measurements

Buildup of oil deposits at switch frogs.



How oil is carried from journal to wheel tread.

were made while attempting to control all factors in the preparation of the plate surface, such as degree of polish, cleanliness, and the time interval between polishing and making the measurement. After considerable investigation a definite pattern began to appear between adhesion on the plate and the ability to wet it with water. When the plate surface would not wet with water, adhesion was low. Conversely, when the surface was wettable adhesion was high. While an electroplating expert would have immediately spotted this tell-tale sign of film contamination, we were slower in recognizing its significance. Then the question arose, what was this contamination? Several weeks of mystery surrounded the happenings on the surface of the plate until it was realized that oil from the hands was the culprit. Even though the hands did not touch the top surface of the plate, it became contaminated by the action of water-propagated oil creepage.

The next question was, how does this creepage occur? Further investigation showed that one fingerprint on the highly polished steel surface, when moistened with water, was capable of spreading an invisible film over the entire plate surface. This reduced adhesion from 35 per cent to 15 per cent, even with 75,000 psi contact pressure. The difficulty in our cleaning method had been that in polishing the plate the fingers touched its edge. When the polishing grit was rinsed from the plate the water spread over the surface and reached the fingermarks on the edge. The oil in the fingermarks then displaced the water from the plate surface and left an invisible oil film which prevented wetting of the plate. This effect was most pronounced with a high degree of surface polish. The next step was to investigate the effect of using different oils. The same result was produced with a spot of whale oil, and with partially degraded (oxidized and volatilized) oil samples taken from rail heads. In each case a minute quantity of the oil sample, when contacted with water, would creep over the entire plate and drastically reduce adhesion even though the contact pressure was 75,000 psi. In contrast to this fresh machine and lubricating oil samples would float to the surface of the water giving a rainbow-colored hue, but would not dispose the water film by creepage action. This creep effect was to become the key to understanding fluctuating adhesions on steel rails.

Film Characteristics

As mentioned previously, creep films have breakaway adhesions as low as 15 per cent. If a surface contaminated with such film were rubbed with a cloth, the adhesion dropped as low as 10 per cent. This rubbing action evidently tended to make the film more uniform and continuous. These films are capable of withstanding extremely high pressures without breakdown. An example of creep film is sometimes found on silverware. The expression "greasy spoon" is a good description of silverware that is contaminated by this oil film which prevents water from wetting the surface.

Non-creep films, were the oil floats to the surface, do not give as low an adhesion as is present with creep films. Rubbing the surface with a clean cloth will increase the adhesion factor when a non-creep film is present. It appears that the adhesion in this case is a function of film thickness. Generally films of this type are not as tough as the creep film and are more easily destroyed.

Oil deposited along outer edge of low rail at wide-gage curves.

The following table summarizes the adhesion measurements made in the laboratory.

TABLE I—ADHESIONS WITH VARIOUS TYPES OF FILMS

Maximum Contact Pressure — 75,000 Psi

Surface Condition	Static Coefficient of Friction	Film Appearance
Surfaces—clean, wettable and either dry or covered with distilled water. Finishes from 150 grit cloth to 400.	.30 to .35	None
Thin layer of petroleum oil deposited over plate surface.	.20	Visible
Layer of petroleum oil on plate blown very thin with compressed air.	.21	Opaque
Plate with above petroleum oil film rubbed vigorously with clean cloth. (Friction coefficient is a function of film thickness.)	.15 to .27	Invisible
Oil from fingers deposited over plate surface by direct contact.	.16 to .19	Opaque
Above film rubbed vigorously with clean cloth.	.10 to .13	Invisible
Oil from fingers allowed to spread over plate surface by contact with water. (Creep film.)	.18 to .21	Invisible

Field Work

At this time the investigation was moved from the laboratory to the field to see if a correlation existed between conditions on actual rail and those of the test plate.

The wear band on mainline rail is a highly polished surface. It was found that on sunny days this surface could be wet with water. On some cloudy days, however, especially when the relative humidity was high, it could not be wet. Following a heavy rain the wear band was always wettable and generally rust speckled. On particularly damp mornings when the band was not wettable, a greyish streaky discoloration would sometimes appear. A sample of this film was wiped up with filter paper and analyzed as follows:

86 per cent—Moisture
14 per cent—Residue composed of oil—14 per cent; iron—5 per cent to 20 per cent, estimated; silica—most of remainder; copper—trace.

As the analysis shows, a high percentage of water was present, indicating that the rail temperature was near the dew point. The residue was mostly iron and silica. This is accounted for by wear and the fact that the track was frequently sanded since the location was on a 2 percent grade. The significant thing was that 14 per cent of the residue was oil.

The next step was to correlate wettability of the wear band with adhesion. For this study the laboratory device was modified. The barrel member was fastened in a U-shaped holder containing an outrigging. A pull scale attached to the outrigging measured the pull necessary for breakaway. This, in turn, gave a measure of adhesion. Rail adhesion was found to be higher when the wear band was wettable and lower when it was not wettable. Particularly low values were found whenever the measurement was made in the vicinity of oil deposits on the rail on a cloudy, damp morning. This was true despite the fact that the spot measured appeared, by visual examination to, be clean and free of oil. The following table shows the range of adhesion for various types of track and weather conditions. Except where noted, measurements were taken on wear bands free of obvious grease and oil.

TABLE II—ADHESIONS UNDER VARIOUS TRACK CONDITIONS

Adhesion Factor	Track Conditions	Weather
Mainline — Level Tangent Track		
.43 to .25	Wettable (Film Free)	Cloudy, 67 per cent relative humidity. Recent rain.
.30 to .20	Not Wettable	80 Per cent relative humidity. Sun just beginning to shine.
Branch Line — 2 Per cent Grade, Tangent Track		
.43 to .36	Wettable Section (Film Free)	Cloudy, overcast. 75 per cent relative humidity.
.27 to .23	Not Wettable Section	
.25 to .16	Not Wettable	Overcast. Extremely low ceiling. 87 per cent relative humidity.
Branchline — 1 Per cent Grade, Slight Curve, Mountain Valley		
.27 to .17	Not Wettable	Mountain fog. Creek nearby. Overcast.
.15 to .10	This measurement was made on the wear band of a rail coated with oil deposits.	

All of the above measurements were made on dry rail. The wettability was determined after the measurement was made. Additional tests were made after applying water to the rail. If the water was applied only to the wear band and it was film-free, no change in adhesion factor was noted. In cases where the water contacted traces of grease or oil, a reduction in the adhesion factor was found to occur.

It should be emphasized that the above figures are static adhesion. Rolling adhesion will become less with increasing locomotive speed because of truck riding qualities, rail joints, etc.

Observations in Service

With the conclusion fairly well established by these readings that moisture-propagated oil films are a major cause of wheel slip, actual observations from the engine cab were undertaken. More than 1,500 miles of riding in mountainous territory cemented this belief. Wheel slips were recorded and marked by location.

Subsequent track inspections showed that 90 per cent of the slips occurred on curved track, at road crossings, switch points, frogs and crossovers where oil deposits were present on the rail outside the wear band. An example of this is the buildup on a switch frog, shown in one of the illustrations. At switch points a similar buildup occurs on the stock rail.

The next question to be answered was, how does this oil deposit get on the rail? The outside face and outer portion of the tread of many car wheels are soaked with journal oil leakage. This is shown in one of the pictures. Normally the outer portion of the wheel tread extends beyond the rail head and hence does not contact it. At frogs, switchpoints, and crossovers, however, this oily portion of the tread comes into contact with the rail and lays down a deposit of oil. A similar occurrence takes place on wide-gage curves. Car wheels entering the curve tend to shift toward the high rail. This causes the oil-soaked portion of the tread to contact the outer edge of the low rail and results in oil deposits, especially when the low rail is peened or badly flowed. If the gage exceeds 57 inches, the oil deposit becomes pronounced, as illustrated in two of the photographs. The condition at road crossings is mainly oil contamination from highway vehicles which is spread over the rail.

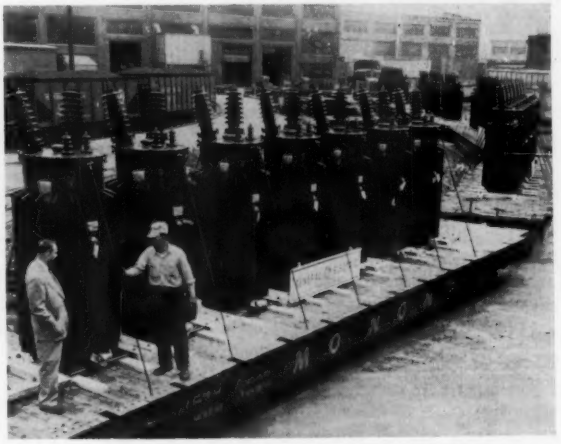
Some curved track showed adhesions as low as 14.5 per cent, when measured from motor torque at 11 mph train speed. A definite relationship was also observed between the number of slips and weather conditions—damp, misty nights producing the most slips. Examination of yard tracks following a run on such nights showed they were not wettable.

The Mystery Explained

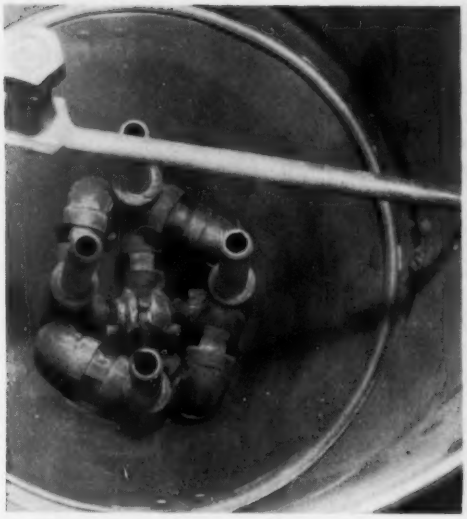
How then does this cyclic appearance and disappearance of track film take place? Traffic and heat (such as sunlight) destroy the invisible film on the wear band. Without this film high adhesions are present. When a sudden rise in relative humidity takes place, the rails approach the dew point. This may be caused in a number of ways such as the onset of rain, cool evening air in the mountains or low lying areas, etc. If the rails reach the dew point, a thin, invisible, water vapor film forms on the wear band. As this film extends to the edge of the rail, it may contact a partially oxidized oil deposit. As soon as this occurs, a thin, invisible creep film of oil replaces the former vapor film. Now the wear band is covered with a thin invisible oil film capable of withstanding pressures in excess of 75,000 psi. The smoother the surface the more easily creep action will form this film. For this reason the wear band on the rail —especially the highly polished manganese steel in frogs, crossovers, and other special work—is particularly susceptible to this film formation. The oil deposits act as reservoirs for the formation of the film. Heavy rain causes these films to attempt to extend themselves to infinity and in this way exhaust the available creep oil supply on the outer edge of the rail. Therefore, a heavy rain acts as a scavenger of creep oil from the rails and so restores good adhesion. Static adhesion on these invisible creep films on the wear band has been measured as low as 16 per cent. In cases where the wear band has been covered with visible oil deposits in a partially degraded state, static adhesion as low as 10 per cent has been observed. Add to this effect of truck riding qualities and rail joints and the value could easily be low enough to account for even high-speed wheel slip.

This cyclic formation and destruction of wear band films accounts for the mystery of changing adhesion factors on the same rail. Sections of rail have been observed where the breakaway adhesion factor was between 35 and 42 per cent in the middle of a sunny afternoon. This same rail at 5 a.m. on a misty morning has had an adhesion factor as low as 16 per cent. Little wonder that heavy tonnage trains, operating in mountainous territory with many sharp curves have difficulty keeping their feet when light rain or misty conditions are encountered. Conditions are especially bad after several weeks of dry weather, since warm dry weather enhances the buildup of oil deposit reservoirs on the rail head. All that is required is for moisture to form on the wear band. This will spread a creep film on the rail and reduce adhesion so drastically that maximum tractive force cannot be sustained at lower train speeds. Under such conditions the skill of the engineman many times spells the difference between a train stall and completion of the last mile of a difficult grade. If conditions are bad enough, even sand will not buy that last few percent of adhesion necessary to sustain the required tractive force.

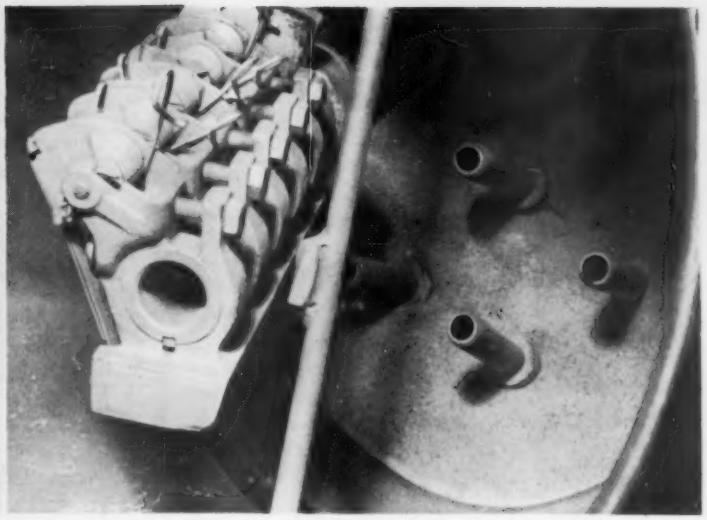
An understanding of the phenomenon of fluctuating rail adhesions has paved the way for an investigation of possible remedies. Work is being carried on to develop means to remove and prevent the oil film formation. The ultimate hope is to attain fair weather operation as an everyday reality.



These 38 transformers, loaded on 6 flat cars, recently set a new record for the General Electric Company's Distribution Transformer Department, at Pittsfield, Mass. They will be used to step down electric power from 67,000 volts to 7,200 volts at substations.



Interior of the cleaner without brush rigging and without sand.



Looking down into the cleaner with brush rigging on the spit and sand in place around the four sand ejectors.

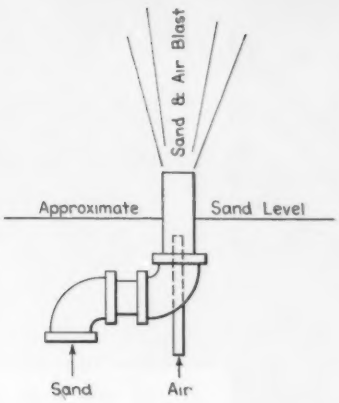
Brush Rigging Sander

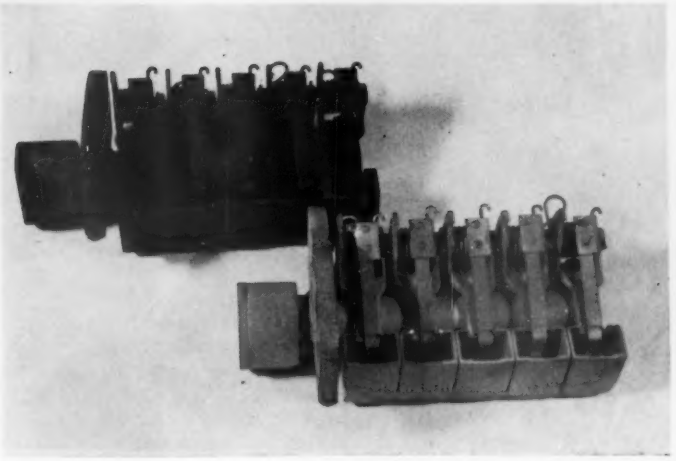
A DEVICE for cleaning brush rigging with sand has been developed in the Erie Shops at Marion, Ohio. It consists of a drum with a conical bottom, containing about a bucketful of locomotive sand. Four air jets near the bottom draw sand out of the bottom and eject the sand in four conical streams toward the top of the drum.

Near the top of the drum is a spit, turned by a hand crank from the outside. Welded to the center of the spit is a threaded stud and nut which provides for attaching the brush rigging to be cleaned.

A tight cover closes the top of the drum when the device is in service and air is released from the drum through a 2-in. pipe nipple and ell. A fine screen covers the open end of the ell.

Left: Brush rigging cleaner being operated by its inventor.
Lower Left: Sketch showing principle of sand ejector operation.
Lower Right: Generator brush rigging before and after cleaning





When the rigging to be cleaned is attached to the spit, the cover is closed and air is admitted to the four jets. As the operator turns the spit, sand is blown against the rigging from all angles. Three or four minutes are enough to thoroughly clean the brush rigging. The sand falling back to the bottom of the drum is used over and over.

The principle of the air jets is shown in the sketch. For the operation, the shop air pressure is reduced to 50 lb. by a reducing valve. There is also a trap in the air line for removing water from the air. The cleaner was devised and built by R. L. Brown.

An Electrical Section Report

Power by Wire or Coal by Train?

A comprehensive report on the relative costs of transmitting electrical energy versus transporting fuel is presented in the 1954 report of the Committee on Transmission Lines, of the Electrical Section, Association of American Railroads. The report deals with a consideration and analysis of railroad transporting of coal from the coal fields to the electric power company generating stations, located at the load center, as opposed to location of generating plants at the coal fields and the transmission of electric power to the load center. The latter method, of course, results in considerable traffic loss to the railroads.

Space is not available here to reproduce the entire report, but the following conclusions are most interesting.

1. Although it is not possible to present a generally applicable formula for the cost of transmitting energy, it is not difficult for the competent engineer to prepare a reasonably accurate estimate, once the conditions are known for a particular case. Each case must be the subject of a separate study.

2. In relatively few cases, under present conditions, can long distance transmission, even at very high voltage, be justified on the basis of competition with coal transported by rail.

3. The larger the concentration of generating capacity in a power plant and the better the load factor, the longer the distance at which power can be transmitted economically.

4. The higher the efficiency of the power plant and the better the grade of coal available, the shorter the distance at which power can be transmitted economically.

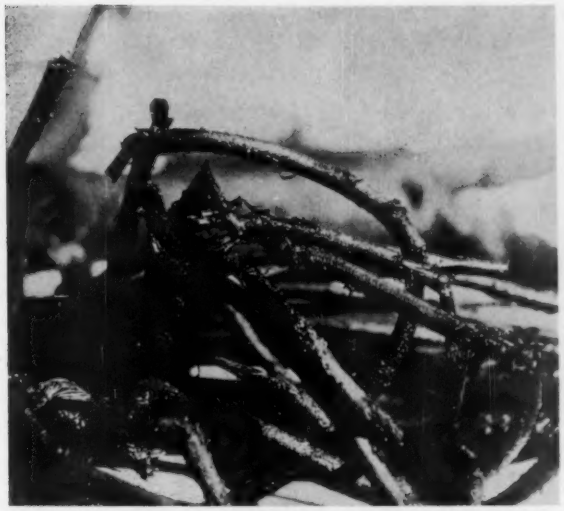
5. During the early stages of periods of rising prices, transmission line construction is more attractive to the power companies as they can thus be assured of a long term, relatively constant rate for transporting energy.

6. The railroads should keep themselves alert to the problem in order to exert every effort to maintain a favorable competitive situation.

It should be emphasized that the conclusions of this study are based upon present conditions. The loads referred to by the authors quoted are those anticipated more than 20 years hence. During such a period of growth, changes in economic conditions or scientific developments could alter the picture greatly. For example, perfection of methods of conversion of coal to oil at the mines for pipe line transmission might bring about great changes. The committee, therefore, offers this report as a current, quite general, summary of one phase of the study of the transportation of energy in this country, and not as a forecast of the situation which may obtain in the future.

It is recommended that the subject be continued and that, from time to time, as developments warrant, addition reports be prepared to keep the information current.

A freshly overhauled, diesel-electric locomotive moves out of the North Billerica, Mass., Shops of the Boston & Maine.



Cable removed from a diesel-electric locomotive after 12 years service.

Damage done to cable in the removal—part of it was dry and brittle and part oily.

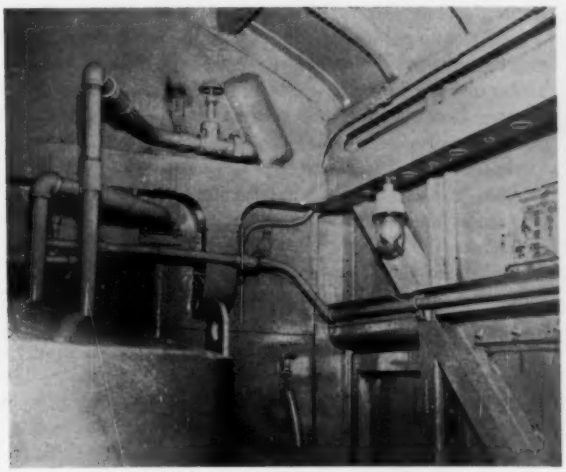
Rewiring Diesels Restores Insulation Values

This report was consolidated into several different subjects, all related to locomotive rewiring. The first subject, "Maintaining or Restoring Adequate Insulation Values and Elimination of Water, Oil, and Dirt Entering Conduits, Main Generator Sumps and Electrical Cabinets," deals in proper procedures in maintaining electrical apparatus on a diesel locomotive. Next was the subject, "When is complete rewiring of diesel locomotives necessary" and "What is the Cost?" Depending on type of service and type of insulation, rewiring needs might vary from 7 to 12 years. Costs, of course, vary with the type of locomotive.

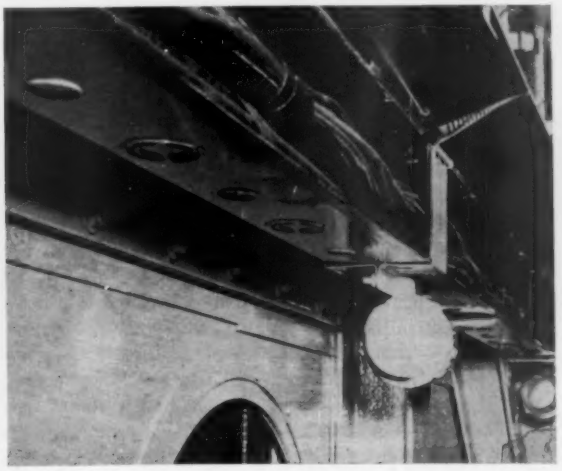
A rather long discussion was presented on the use of sheet metal duct vs. conduit. Since duct has a cheaper first cost and offers several maintenance advantages, several railroads have made experimental installations when rewiring. Another subject dealt with, "Bench Making of Harness for Electrical Cabinets." It is the consensus of opinion that considerable time and money can be saved by manufacturing harnesses before applying the wires to the locomotive cabinet or duct.

Still another subject, "Complete Rewiring and Types of Materials," covered standard specifications and elimination of special wires to improve stocking resuirements. Touched upon was the subject, "Sub-Assemblies of Electrical Cabinet for Unit Changeout," which deals with procedures in handling power apparatus while locomotives are being overhauled. Last, but perhaps the most

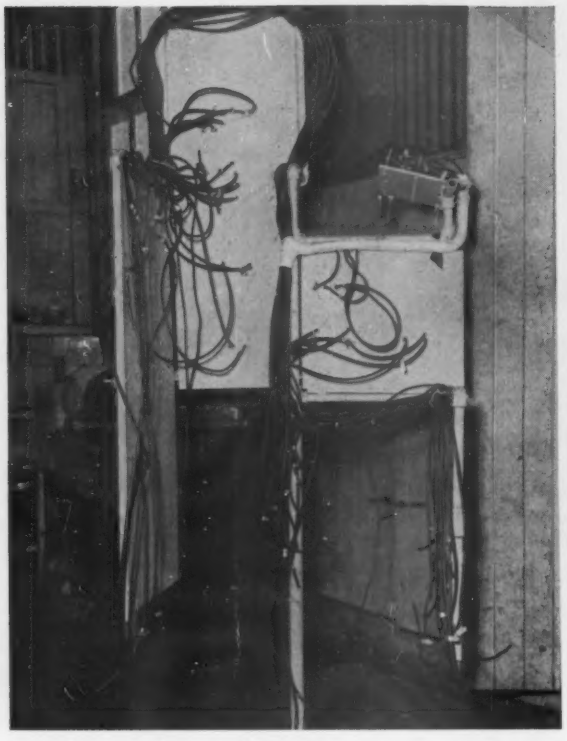
This is one of the reports that were prepared for this year's meeting of the Locomotive Maintenance Officers' Association which was cancelled. Other reports in connection with the meeting appear elsewhere in this issue.



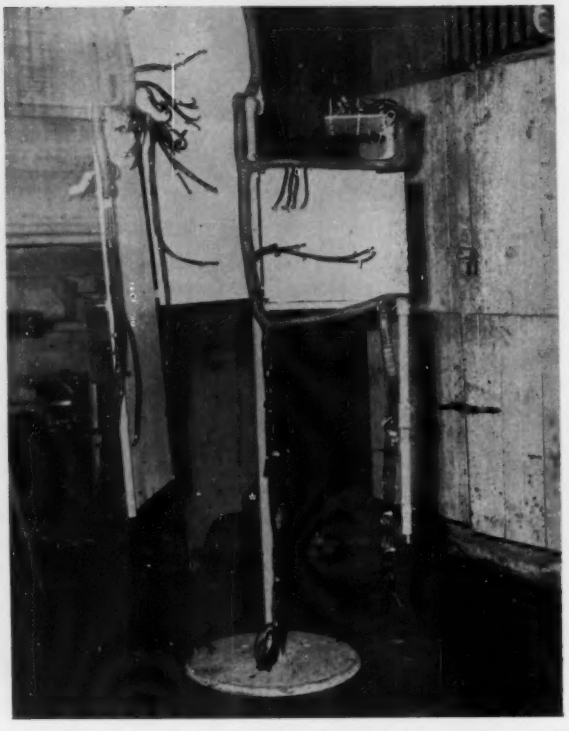
Application of sheet metal duct shows right angle turn, Y connection and cabinet entrance.



Duct with cover raised to show wire bundle. Engine room lights are mounted on bottom of duct.



Harnessing wires for electrical cabinets—start of the work on a "harness" board.



Completed harness with eyelets and wire identification markers, ready for application to the cabinet.

significant item was that of "modifications" a very important subject due to inexperience of most railroads in handling the problems involved.

To report on each of these subjects, even briefly, would require too much space in this issue. Some unrelated subjects have been abstracted herewith, others will be presented in subsequent issues. Editor.

Maintaining or Restoring Adequate Insulation Values and Elimination of Water, Oil, and Dirt Entering Cabinets, Main Generator Sumps and Electrical Cabinets

Lubricating oil, fuel oil and electricity are all necessary to the function of the diesel locomotive. If each could be confined to their respective systems, many maintenance problems would be removed. In order to maintain adequate insulation values, it is a must that water, oil and dirt be restrained from entering or remaining in conduits, main generator sumps and cabinets.

It is doubtful that a locomotive will ever be wired in such a way that leaks can be eliminated or tolerated. Generally, if any exposed wires or cables are dirty and oil soaked, they can be cleaned with a solvent and allowed to dry. Wet or water soaked wiring can be dried out by blowing warm air over them or through conduits. Wood cable cleats have become wet should be removed, dried out and impregnated with insulating varnish. Drain holes should be cut in the bottom of the main generator sumps. These sumps should then be cleaned, dried and spray-painted with Glyptol or other insulating paints.

Conduits can be sealed at the ends with compounds and the cables taped with self-vulcanizing tape from the ends of the conduits to and including lugs and terminal connections. In order to confine oil leaks, shallow dams can be welded to the floor around the engine.

It is recommended that the main generator commutator and brush holders and power contactors, reversers, cam switches, etc., be spray washed and kept free of oil, water and dirt as far as possible.

Main generator risers, string bands and creepage surfaces should be cleaned and repainted as the necessity arises. Dry compressed air can be blown on the commutator surface while it is rotating to remove copper and carbon dust from the slots.

While not covered in this report, restoration of insulation values to main generator and traction motor windings is accomplished by passing the armatures and frames through a degreaser, placing them in an oven for drying, impregnating with varnish and baking.

The cleaning, drying and repainting necessary in this preventive work brings up the question of expenditures. The committee feels that preventive maintenance is cheaper because there will be fewer traction motors, main generators, reversers, cam switches and power contactors to replace and repair and less wire and cable to replace. Caution should be used in respect to preventive maintenance or the railroad might reach the point of diminishing returns.

When is Complete Rewiring Necessary and What is Cost?

Locomotives wired with cable and control wire having varnish cambric insulation and cotton braid covering required rewiring after about eight years of service. The break-down of this insulation usually manifested itself in the engine room where it was subject to high heat and became brittle, or in damp conduits and terminal boxes.

Therefore, whenever practical, rewiring should be done concurrently with complete locomotive overhaul—about

seven to eight years. Cambric insulated wire should be replaced at the first overhaul. With not enough experience with neoprene insulated wire, the committee is reasonably certain that it will last sixteen years or longer.

The average cost for rewiring an E6 type lococotive is about $1,900 for labor and $1,300 for material. For an F7 type, labor averages $1,400 and material $1,200.

Use of Sheet Metal Duct vs. Conduit

One railroad has adapted a commercially produced sheet metal duct to replace conduit on its diesel locomotive "road" units when their units are being rewired. Since all rewired units, 28 in total, where modernized when duct was applied, the former conduits were too small to accommodate additional circuits. The duct was 4 in. by 4 in. for principal runs and approximately 1-½ in. by 2 in. for subordinate wiring. The larger duct, run down each side of the engine room, was sufficient to carry all control wires, battery supply cables and power cables to various resistors and regulators mounted on the engine room walls. Lights were mounted directly on the bottom of the duct making a simple and cheap installation. Runs to the engine governors and to lights and accessories in the nose were run in the smaller duct. On a rewire job, men using this duct say it can be applied in one half the time for a similar conduit installation.

Several other railroads have made experimental installations of this same duct when rewiring. There are several types of duct made by electrical supply firms and individual railroads should investigate all to determine what best meets their needs. In addition to cheaper first cost, the duct offers several maintenance advantages due to accessibility of wiring.

Bench Making of Harnesses for Electrical Cabinets

The practice of harnessing wires for electrical cabinets is not widely used in heavy overhaul shops of railroads at the present time. However, it is the consensus of opinion of those who have studied this practice that considerable time and money can be saved by manufacturing the harness before applying the wires to the cabinet or duct. A board made up with the apparatus terminals properly located for a given group of locomotive units will permit harnesses to be assembled, as required in the electrical shop away from other crafts, even though a number of circuit changes could be made during the life of the harness board.

It is generally found that a sheet of plywood cut to the dimensions required and pierced with finishing nails or small headed screws at the location of the terminals makes a satisfactory board. One locomotive builder and several railroads perfer a plastic type, non-pressure sensitive tape with no adhesive for harnessing wires.

All power apparatus should be changed out and repaired while the locomotive is being overhauled. Also, a limited amount of control equipment should be changed out at the same time. Damaged or inoperative equipment should be removed from the locomotive at running repair shops unless repairs are minor. Making repairs to equipment while it is in the locomotive is trying, time consuming, costly and often results in inferior jobs.

Since there is such a large number of types of this equipment requiring a multitude of repair parts, the committee feels that repairs should be performed at centralized electric repair shops. The next best plan is to return the equipment to the respective manufacturer for all repairs except minor ones.

"Complete Rewiring and Types of Materials" and "Modifications" will be presented in subsequent issues. The foregoing material was abstracted from the report "Diesel Rewiring and Restoration of Insulation Values" by F. E. Stubbs, assistant diesel superintendent, Southern, who is chairman of the Committee.

Test Rack for Control Jumper Cables

A control jumper cable test rack which was developed at the Santa Fe diesel shop, Argentine, Kansas, has been giving good results. Defective control jumper cables are a common source of trouble in the electrical operation of diesel locomotives. The cables are examined at each quarterly inspection and at any time trouble is reported.

For proper inspection, special equipment is required, and the test board, shown in the illustration, was designed and built with material common around a railroad shop. It has a simple wiring arrangement, and is easy for one man to operate with positive results. It consists of jumper cable receptacles of the 21-pole and 27-pole types, mounted on a board with a two-position selective main switch, which delivers 3-volt dc electric power in one position and 110-volt ac power in the other position, the circuits being established through two rheostats to make connections to the different wires.

The three-volt dc is used for the continuity test, and the 110-volt ac circuit is used for the shorted conductor test and for the ground test.

Questions and Answers

General Motors

Diesel-Electric Locomotives

This is a new series of Questions and Answers pertaining to General Motors diesel-electric locomotives. The references to manual and page numbers in the text indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

Independent Brake Valve

G84-Q—Describe the independent brake valve.
A—The S-40-F self-lapping independent brake valve has two handle positions: RELEASE and FULL APPLICATION, with the application zone between the two positions.

G85-Q—How is release of locomotive brakes obtained by use of the independent brake valve?
A—By depressing the handle in release position.

K-2-A Rotair Valve

G86-Q—What is the K-2-A Rotair valve and what are its positions?
A—It is a selector valve having four positions: FRGT., FRGT. LAP, PASS. LAP, and PASS.

Safety Control Foot Pedal

(Manual 2310—page 20)

G87-Q—Where is the safety control foot pedal located and how does it function?
A—Located on the floor in front of the engineman's seat, the foot pedal when depressed, prevents a safety control application. On equipment using the hinged brake valve handle, the foot pedal provides an alternate control of the penalty feature.

G88-Q—When is it permissible to release the foot pedal?
A—When the brake valve handle is held depressed just enough to touch the sanding bail, or when brakes are applied with 30 pounds or more brake cylinder pressure.

Air Compressor

(Manual 2310—page 408-409)

G89-Q—With what kind of compressors are the power plants provided?
A—An air-cooled three-cylinder two-stage air compressor driven through a flexible-coupling from the armature shaft of the main generator.

G90-Q—How is the compressor lubricated?
A—The compressor has its own pump and pressure lubricating system. With the engine stopped, the level in the compressor crank case can be checked on the bayonet type gague.

G91-Q—What should be the minimum lubricating oil pressure of the compressor lubricating system?
A—A minimum of 10 lb at idle speed (275 rpm).

G92-Q—Describe the arrangement of the air compressor.
A—The compressor consists of two low-pressure and one high-pressure cylinder; the low-pressure cylinders being set at an angle to the vertical high-pressure cylinder. The pistons of all three cylinders are driven from a common crankshaft.

G93-Q—Where does the compressed air go first?
A—Air from the low-pressure cylinder goes to an intercooler or radiator, to be cooled before entering the high pressure cylinder.

G94-Q—What is the intercooler provided with?
A—A pressure gauge and safety valve (relief valve).

G95-Q—What pressure should the gauge normally show?
A—The gauge should normally read approximately 34 lb when the compressor is loaded, and any marked deviation should be reported.

G96-Q—What should be the setting of the intercooler relief valve?
A—This setting should be 55 lb.

G97-Q—What is the arrangement for control of the compressor operation?
A—Since the air compressor is directly connected to the engine and is in operation at all times when the engine is running, an unloader is provided in the heads of both high and lo wpressure cylinders, to cut out the compressing action, when actuated by air pressure.

G98-Q—How does the unloader function to cut out the compressing action of the air compressor?
A—By blocking open the suction or inlet valves of the high and low-pressure cylinders.

G99-Q—When does the compressor resume pumping?
A—When main reservoir pressure to the unloader is cut off and air exhausted from the unloader piston, the suction valves are permitted to seat again and compressor resumes pumping.

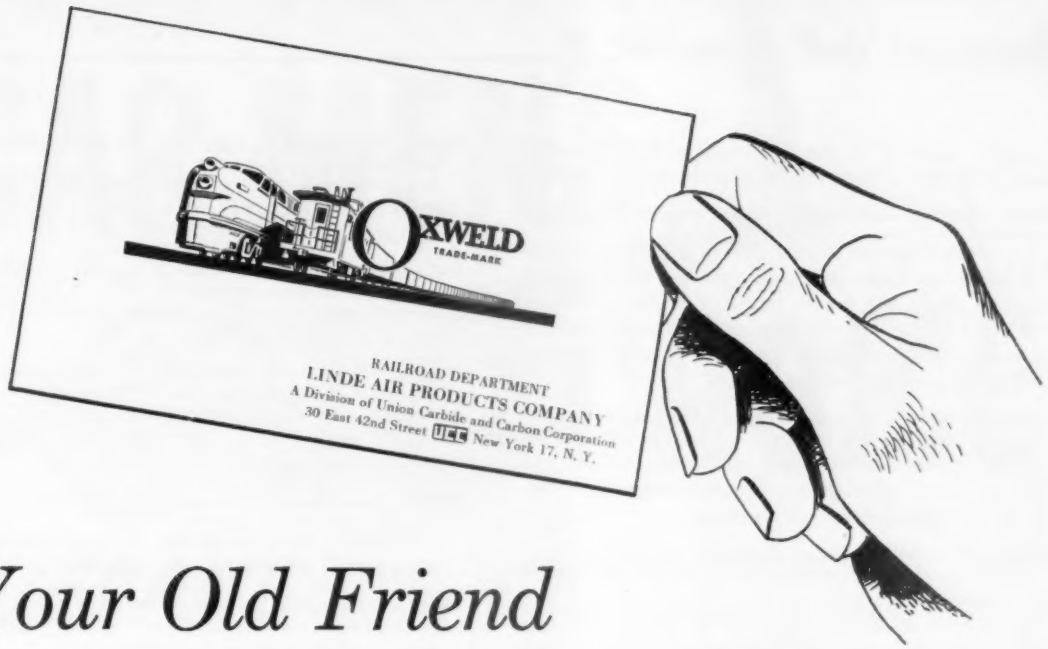
Compressor Control

(Manual 2310—page 411)

G100-Q—What serves to control the loading and unloading in each unit?
A—An electro-pneumatic control system.

G101-Q—Why is an electro-pneumatic compressor control system required for multiple unit operation?
A—All compressors must be synchronized to pump air into their respective main reservoirs when the pressure in any one unit drops to 130 lb. When the air pressure in all main reservoirs reaches 140 lb the compressors will unload.

G102-Q—What is each unit equipped with?
A—A compressor control switch (CCS) actuated by main reservoir pressure, a compressor control magnet valve, and a compressor relay (CR). A compressor



Your Old Friend Presents a New Card

The men you have known as representatives of Oxweld Railroad Service Company will now be calling on you as representatives of the newly formed Railroad Department of Linde Air Products Company.

The combination of these two Divisions of Union Carbide and Carbon Corporation has been effected so that you may be better served and have the full benefit of the combined knowledge and facilities of both organizations. Men of the OXWELD organization bring to the new Railroad Department years of valuable experience and a thorough knowledge of the railroad industry.

LINDE men, in turn, bring wide skill in welding and cutting applications in a broad range of other industries that may be adapted for railroad use. In addition to your old OXWELD friends you will soon meet other LINDE representatives for the first time. You may be sure that these new friends will be just as helpful and co-operative as the OXWELD people who have served you in the past.

LINDE's coast-to-coast chain of District and Region Offices will now be able to serve more closely the needs of the railroad industry for apparatus and welding supplies, and the helpful technical service for which both LINDE and OXWELD have long been noted.

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control wire (CC) runs throughout the locomotive and conn-compressor relays in each unit in parallel.

G103-Q—Locate and describe the compressor control switch.
A—Located next to the alarm bell on the engine side of the electrical cabinet, this switch may be considered to be a single pole double throw switch that is thrown to the LOADED position when the main reservoir pressure drops to 130 lb or to the unloaded position when the pressure reaches 140 lb.

G104-Q—Describe the action in unloaded position.
A—In the unloaded position the compressor control switch causes the compressor control magnet valve to be energized, allowing air to pass through the valve to the compressor unlaoder pistons.

G105-Q—Describe the action in loaded position.
A—The compressor control switch breaks the circuit to compressor control magnet valve in that unit and causes current to flow through the compressor control wire, energizing the compressor relays in each unit.

G106-Q—What happens when the compressor relay is energized?
A—When the compressor relay is energized, its interlock breaks the circuit to the compressor control magnet valve regardless of the position of the compressor control switch in that unit.

Air Compressor Manual Unloader Valve

(Manual 2310—page 411-411)

G107-Q—Describe the compressor manual unloader valve.
A—This is a three-way valve provided in case it is desired to keep an air compressor unloaded irrespective of the compressor control system.

G108-Q—What are the handle positions of this valve?
A—Normally the valve handle is in a horizontal position. Turning the handle to a verticle position causes the compressor to remain unloaded.

Fairbanks-Morse

Diesel-Electric Locomotives

This series of Questions and Answers pertains to Fairbanks-Morse diesel-electric locomotives. The references to manual and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

F91-Q—What is the function of the locomotive lights breaker and when must it be on?
A—Connects all lighting circuits to the main battery switch and must be on in all units.

F92-Q—What is the purpose of the heater and defroster breaker and when must it be on?
A—Connects heater, defroster and black lighting circuits to the main battery switch and it must be on in both A units.

F93-Q—How does the control cut-out switch breaker function and when must it be on?
A—Connects all control circuits to the main battery switch and must be on in all units.

F94-Q—What is the purpose of the dynamic brake breaker and when must it be on?
A—Connects the dynamic brake field loop excitation circuit to the main battery switch and is on in the lead unit only.

F95-Q—How does the electro-pneumatic brake breaker function and when must it be on?
A—Conects electro-pneumatic braking circuits to the main battery switch and is on in the lead unit only.

F96-Q—What is the purpose of the train control breaker?
A—Connects train control circuits to the main battery switch and is on in the lead unit only.

Dynamic Unit Switch

F97-Q—Locate and describe this switch.
A—This switch is located behind the engineers seat (on units are changed, regardless of whether or not a unit setting according to the number of units in the locomotive consist.

F98-Q—When should this setting be changed?
A—Setting should be changed only as the number of units are changed, regardless of whether or not a unit is shut down en route.

Traction Motor and Dynamic Brake Cut-Out Switch

(Bulletin 1706—101-A, page 17)

F99-Q—Locate and describe this switch.
A—This is a knob operated selector switch located behind the hinged door on the engineer's side of the electrical cabinet.

F100-Q—What precaution must be observed when operating this switch?
A—Never change switch position unless engine is first isolated.

Ground Relay Cut-Out Switch

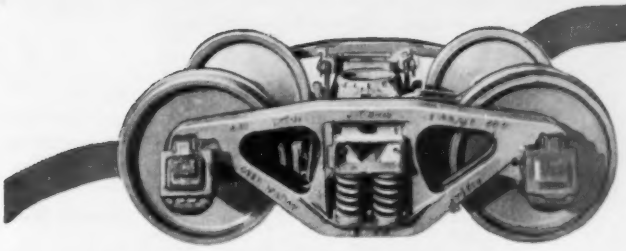
F101-Q—What is the purpose of this switch and where is it located?
A—This is a breaker-type switch for emergency use, located behind the hinged door on the engineer's side of the electrical cabinet, normally sealed in ON position.

F102-Q—What precaution is urged in the use of this switch?
A—Never throw switch except in emergency, as cutting out ground relay protection endangers electrical equipment.

Standby Lighting Knife Switch

F103-Q—What is this switch and where is it?
A—This is a double throw double pole knife switch

CAR MEN'S CHOICE



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located behind the hinged door on the engineer's side of the electrical cabinet.

F104-Q—When does this switch function in normal position?
A—When the switch is up in normal position the locomotive lights breaker is connected to the locomotive battery.

(Bulletin 1706—101-A, page 18)

F105-Q—What is the connection when switch is down, out of normal position?
A—Breaker is connected to the alternating current stand-by lighting transformer for use with shop current. Switch must be in proper position to get lights on the locomotive.

American Locomotive
Diesel-Electric Locomotives

This series of Questions and Answers pertaining to Alco diesel-electric locomotives with General Electric electrical equipment is a continuation of a series, the first of which was published in the October 1950 issue of Railway Mechanical & Electrical Engineer. The references to manuals and page numbers indicate where the original material may be found in the builder's technical publications or instruction manuals. These are usually available to authorized employees on each railroad.

1115-Q—What blocking must be done to get ready for the lift?
A—Place blocks and shims under the generator end of the engine base until the weight of the engine is transferred from the pads of the adapter.

1116-Q—What are the final preparations for removal of adapter?
A—Apply cable through lifting eye; remove nuts fastening the adapter to the face of the engine base and block. First remove the small nuts and capscrews that draw adapter to base, then remove the nuts from the long studs on generator side of adapter.

1117-Q—Describe the removal.
A—Lift the adapter from the engine. Remove and tag shims located on top shoulder of adapter.

Inspection and Maintenance

1118-Q—What attention should the adapter receive under inspection and maintenance?
A—Clean and surface inspect. Inspect lube oil drain line from oil catcher for leaks. Examine camshaft thrust screws for burrs.

Installation

(Manual TP-500 Page 508)

1119-Q—What must first be done when about to re-apply the adapter?
A—Apply non-hardening joint sealer on the block and base adapter mounting surfaces.

1120-Q—What is the next operation?
A—Support adapter with cable through the lifting eye and ease over studs on frame and base.

1121-Q—What should follow?
A—Be sure shims are replaced on the top shoulder of the adapter if the same adapter frame and base are being mated. Snug up nuts, drive the two dowels to position adapter, and tighten up nuts.

1122-Q—How is the runout of generator adapter bore checked?
A—Apply plug to one of the crankshaft flange holes, and with a dial indicator and extension attached, check runout of generator adapter bore.

1123-Q—What is the limit for radial runout of adapter to crankshaft?
A—Not to exceed .004" total indicator reading.

1124-Q—What should be done if runout exceeds the limit?
A—Realign adapter to engine in accordance with instructions on applying new adapter.

1125-Q—What else should be applied to complete the operation?
A—Reapply the oil catcher.

Schedule 24 RL Air Brakes

1758-Q—When is the sensitivity of the bridge least affected?
A—When the required amount of resistance is spread between the lower arm of the bridge and the tap going to the B-terminal.

1759-Q—How long can this condition exist?
A—Because of the action of other relays which will be described later, this condition can exist only for a fraction of a second, and therefore, the wattage of resistors R7 and R11 can be small.

1760-Q—Referring to plate 10, what resistors are added?
A—Plate 10 shows the addition of resistors R8, R9 and R12.

1761-Q—Does the addition of R7 (explained under plate 9) affect the balance of the Wheatstone bridge?
A—No.

1762-Q—Why is this?
A—Resistor R7 is not located in one of the four arms of the bridge.

1763-Q—Does resistor R11 affect the balance of the bridge?

A—This resistor does affect the balance of the bridge.

1764-Q—What must be done to offset this action?
A—An equivalent resistance must be placed in the upper right-hand arm of the bridge.

1765-Q—What is done to provide this resistance?
A—The left-hand portion of R9 is used and must be adjusted to a value equal to that of resistor R11.

1766-Q—To what is the remaining portion of resistor R9 adjusted?
A—The remaining portion of resistor R9 is adjusted to equal the resistance of the magnet valves of a train consisting of 24 vehicles.

1767-Q—In what way is rheostat R10 used?
A—This allows rheostat R10 to be used to increase the resistance of the upper right-hand arm of the bidge to equal the resistance of the train line magnet valves on trains of less than 24 vehicles, and makes the full rotation of this rheostat available for such adjustment.

1768-Q—What is one danger to be avoided?
A—Falsely energizing the magnet valves.

1769-Q—If this happens, what would be the result?
A—This would result in an undesired brake application.

1770-Q—What is essential with regard to this condition?
A—It is essential that the voltage drop across the magnet valves from the Wheatstone bridge be safely below the operating voltage of these magnet valves.

1771-Q—Is there any possibility of such a condition?
A—Tests have developed some possibility of such a condition arising if the circuit checking equipment were used on a two-unit diesel without any cars.
cars.

1772-Q—How can this danger be overcome?
A—By connecting resistors in parallel with the magnet valves.

1773-Q—What does such an installation accomplish?
A—This will reduce the voltage drop on that arm of the bridge.

1774-Q—What resistor is used for this purpose?
A—Resistor R12.

1775-Q—What other resistor is added and why?
A—Resistor R8 is added to the upper right arm of the bridge in order to maintain a balanced condition of the bridge.

1776-Q—Referring to plate 11, what is the purpose of adding a milliameter in series with detector relay Y?
A—To accurately balance the Wheatstone bridge to allow zero current through the relay Y when first placing the equipment in operation.

Decisions of Arbitration Cases

Delayed Damage Claim

On January 10, 1952, the C&NW made extensive "No Bill" repairs to Northern Tank Line car 953 due to derailment at the C&NW Proviso yards. Car then continued to destination at Milwaukee via C&NW, was emptied, returned to Tyler, Tex., point of origin, and was again loaded March 12, 1952. The car developed leaks at rivets and seams, and the contents were transferred by the SSW. NTLX contended that leakage was due to the Proviso accident and asked C&NW for defect card which was refused. NTLX asked the opinion of the SSW, whose inspector wrote that damage occurred at time of derailment. This letter, plus a joint (SSW-MP) inspection certificate, were the basis for the NTLX claim. NTLX also noted that the car moved to destination on the C&NW after the derailment. The C&NW stated that the car moved under load to destination after repairs without exception or record of leaks; that the car should have reached Tyler the latter part of January 1952; that the movements of the car between January and March are not accounted for; and that the leak was not detected until 12 days after loading, during which time the car moved a considerable distance.

In a decision rendered April 9, 1954, the arbitration committee found that the evidence submitted did not justify car owner's claim that all damage resulting from accident was not repaired. Therefore, the NTLX contention is not sustained. *Case 1844, Northern Tank Line, Inc., vs. Chicago & North Western.*

Responsibility for Fire Inside Passenger Car

On October 3, 1952, the D&H delivered to the NYC its coach No. 222, which remained in possession of the NYC until Oct. 8 when it was returned marked "Home Shop For Repairs" to remedy damage to electrical equipment from a fire which the NYC acknowledges occurred while the car was in their possession at the Albany passenger station on October 4, 1952. Request by the D&H for defect card to cover this damage was declined by the NYC on the assumption that since these were interior defects car owner is responsible under Rule 7, Section C, whereas the D&H held that Rule 8 (a), Paragraph 3, was applicable and that the delivering line is responsible. The D&H held that Rule 8 (a) makes no exception of electrical equipment, or, in fact, to any car appurtenances whatsoever and directed attention to Arbitration Cases No. 1140 and 1611. The NYC said that the defect originated in the electric locker and damage was confined to the electrical apparatus due to failure of the equipment, while car was en route, over which the handling line had no control, and therefore contended that the car owner is responsible for damage to the electrical equipment due to overheating, short circuit, or any other defect originating in the electrical apparatus and when such damage is not the result of fire originating from another source. The NYC thought that the principle established in Arbitration Case 1704 further substantiated its position in this case.

In a decision rendered April 9, 1954, the Arbitration Committee ruled that the responsibility rested with the handling line under Passenger Car Rule 8 (a), and that the contention of the D&H was sustained. *Case 1845, Delaware & Hudson vs. New York Central.*

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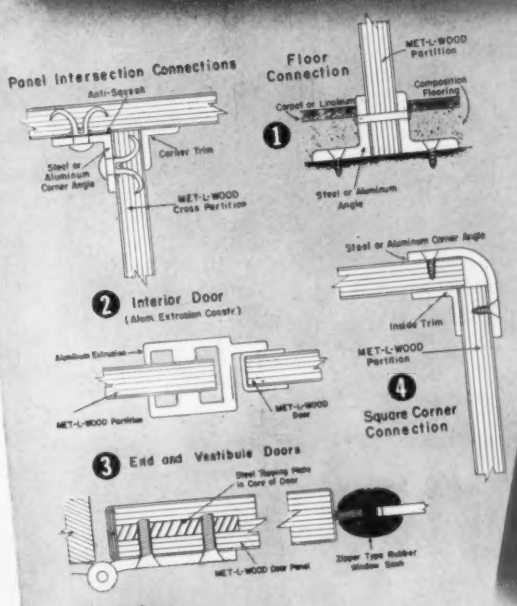

❶ Panel intersections with Met-L-Wood can be made invisible from outside with the use of split rivets. Floor connections may be made in a variety of ways, one of which is shown here, using through-rivets and metal screws.

❷ Interior doors of Met-L-Wood can be fitted with aluminum extrusion door stops; or the Met-L-Wood partition formed so that the door stop is an integral part of the panel.

❸ Steel tapping plate inserts can be put in Met-L-Wood doors at proper places for solidly anchoring hinges and door-opening devices. Note simplicity of using zipper-type window sash with pre-formed Met-L-Wood window openings.

❹ Square or rounded corners are made with Met-L-Wood panels and steel or aluminum corner forms. Corner forms can also be fastened with split rivets or through-rivets, as well as with wood or metal screws.

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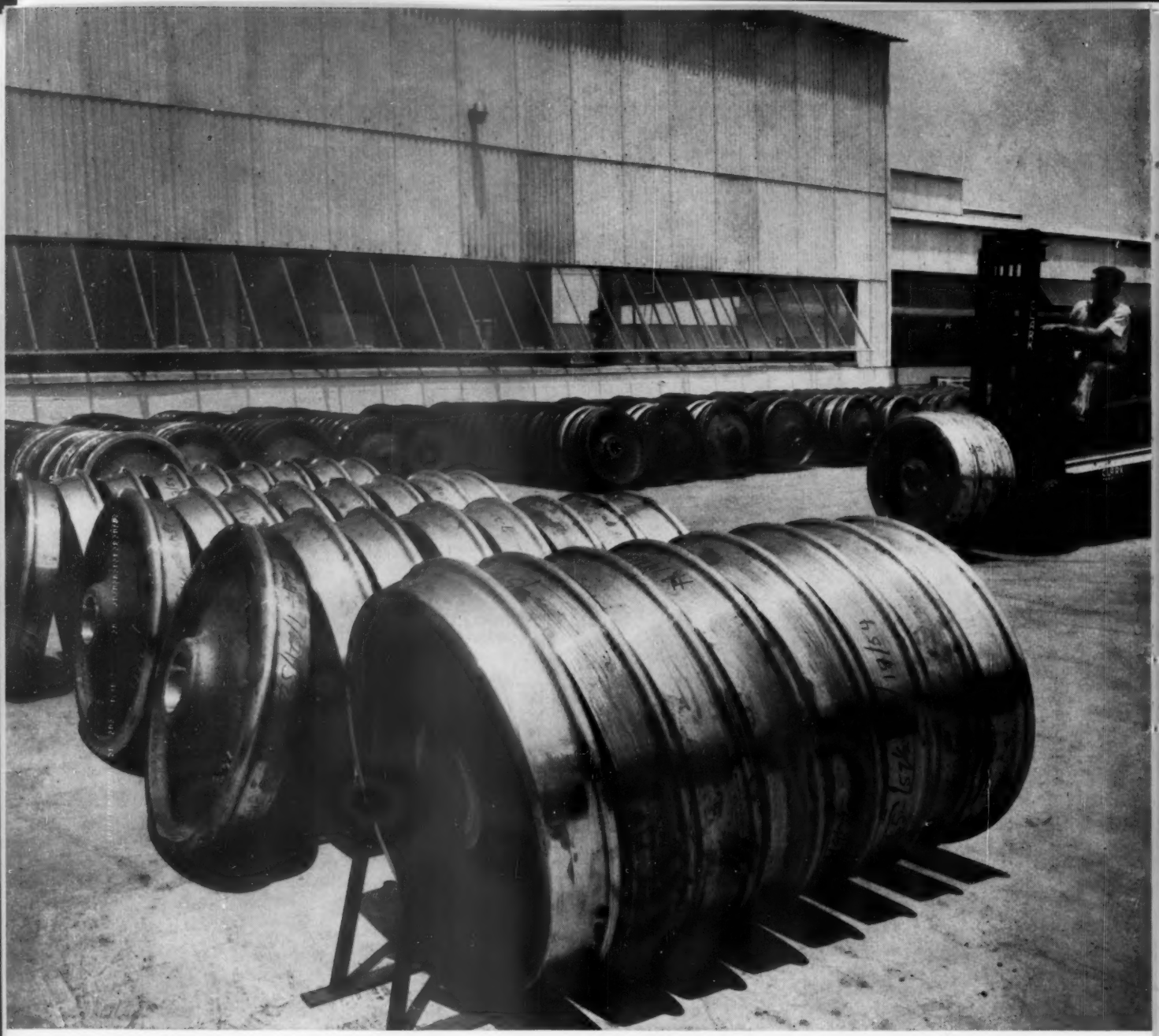


READY FOR SHIPMENT to car shops and railroads: one-wear cast steel wheels made in the new Southern Wheel plant at Calera, Ala.

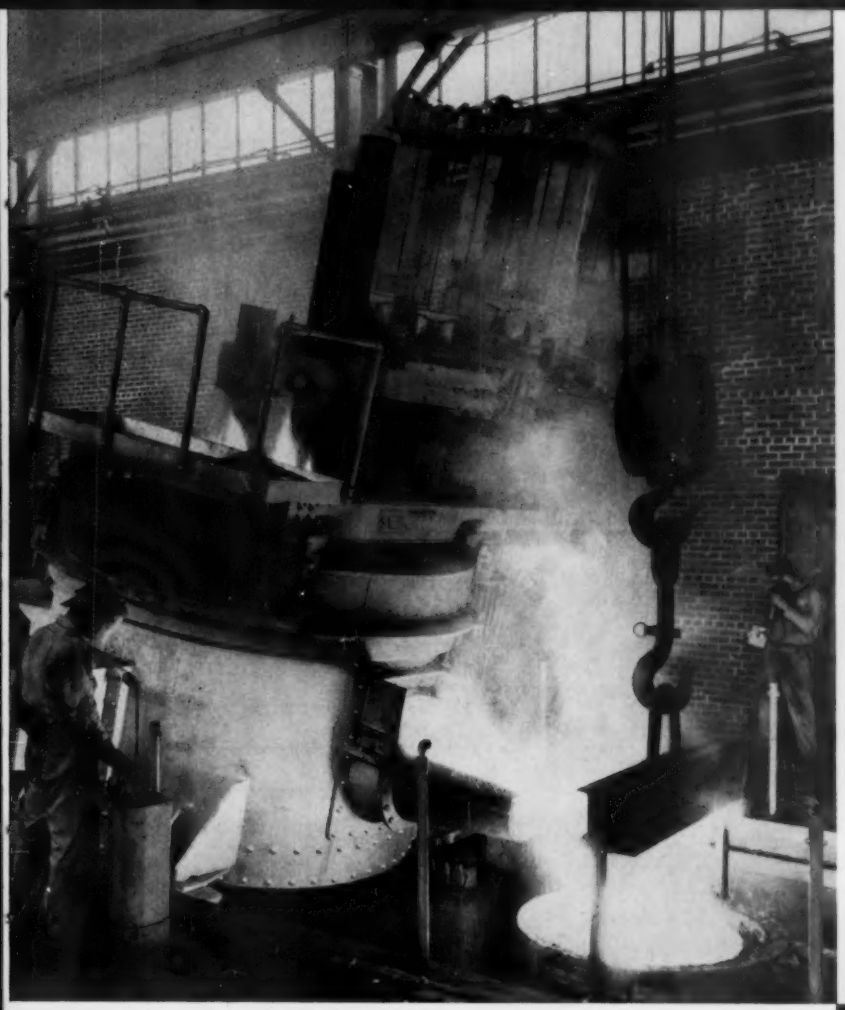
HERE THEY COME!

"Southern" cast steel wheels roll out of Brake Shoe's new plant in Alabama

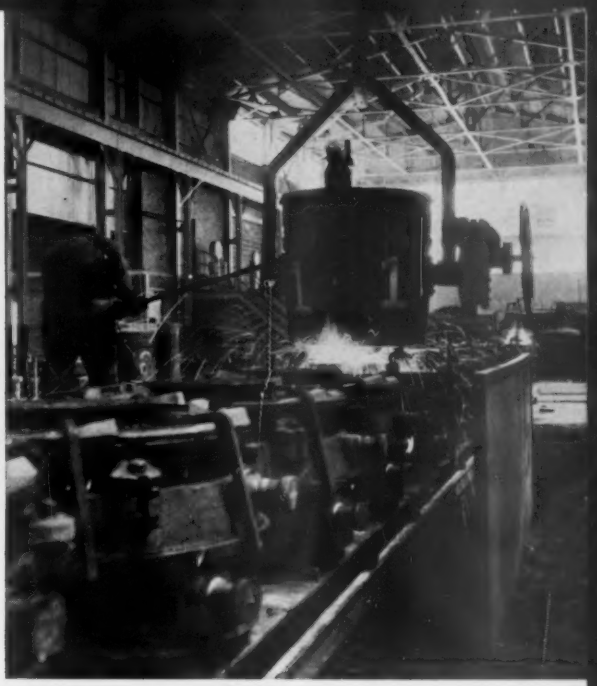
Announced last year by the American Brake Shoe Company after seven years of thorough road test, the new A.A.R. X-2 cast steel wheel is now in production at the Southern Wheel Division's modern new plant in Calera, Alabama, in the Birmingham industrial area.

This 1.5% carbon wheel has rolled up impressive endurance records in *millions* of test car miles under severest operating conditions. For highest quality, it is now being manufactured with the most up-to-date equipment in the efficient new plant shown in these pictures.

Production of the "Southern" cast steel wheel is accelerating steadily, and installation of additional equipment duplicating some of the units shown will soon bring output up to full rated capacity. For details of prices and delivery schedules, consult your Southern Wheel representative. Southern Wheel Division, American Brake Shoe Company, 230 Park Avenue, New York 17, New York (Member of AMCCW).



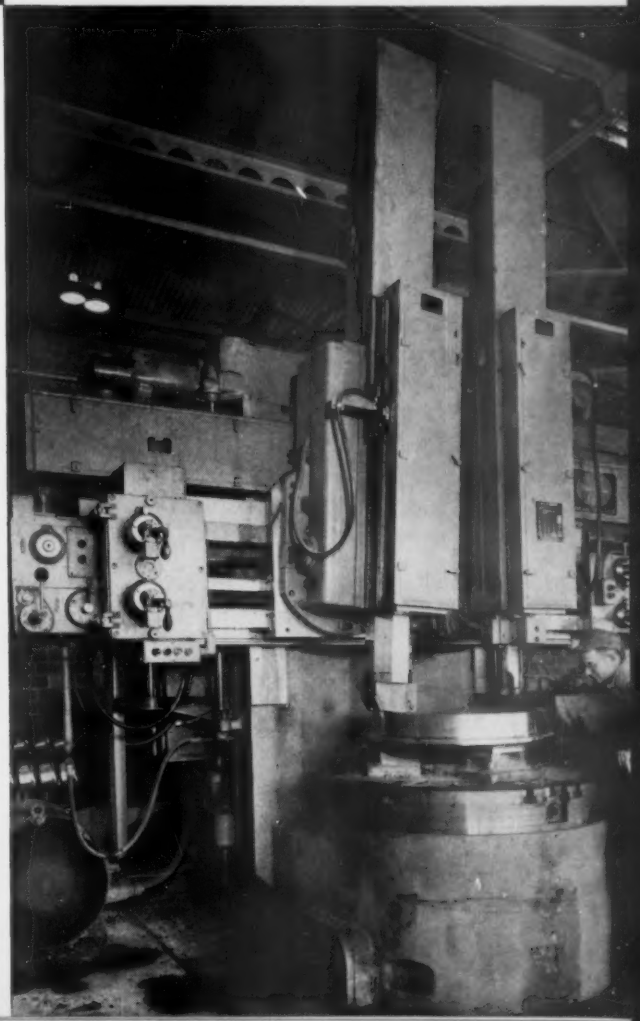
ELECTRIC FURNACE STEEL goes into the A.A.R. X-2 wheel—melted and poured under close temperature control.



WHEELS ARE POURED into sand molds with time-proven casting methods. Flasks travel from mechanized molding room across pouring floor to automatic shakeout on a continuous conveyor. Precision electronic equipment controls subsequent double heat treatment.

SPECIAL VERTICAL TURRET LATHE automatically machines hub and tread of each wheel. Single chucking for all turning, boring and facing operations assures concentricity.

"SOUTHERN" A.A.R. X-2 WHEEL combines 1.5% carbon steel with precision machining for better performance under toughest freight car service.



How Well Does Your Present Source Compare With National's COMPLETE Facilities For Motor and Generator Repair

Most motor repair shops can perform some of the operations listed below. Very few can handle them all. These are not routine operations, but extras which require expensive specialized equipment and experience. National service includes all 17 operations. How does your present repair source compare?

plus value operation	*available at National*	*at your present repair source*
1. redesigning and modernizing by competent engineers	yes	
2. vapor degreasing to insure good bonding of varnish	yes	
3. corncob blasting to prepare surfaces like new	yes	
4. rebuilding and remachining to standard of mechanical fits	yes	
5. temporary hotbanding to seat coils in slots	yes	
6. hot rerolling of permanent bands	yes	
7. grinding and polishing of journal shafts	yes	
8. vacuum impregnating	yes	
9. dynamic balancing	yes	
10. grinding and polishing of commutator at top operating speed	yes	
11. load testing	yes	
12. high frequency testing	yes	
13. electronic bar-to-bar and high sensitivity ductor testing	yes	
14. surge comparison testing	yes	
15. high potential ground testing	yes	
16. magniflux testing	yes	
17. anti-friction bearing inspection	yes	
Total	17	

If you can't answer "yes" for your present source on all 17 operations, you're taking unnecessary chances on getting less than the best repair work. You can't tell in advance on which jobs National equipment and National know-how will pay off in improved performance or longer life. So play it the one safe way — make National your first source for *all* motor and generator repairs.

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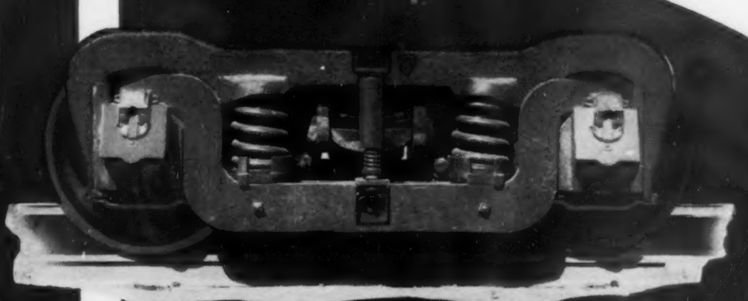

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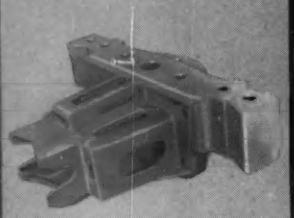
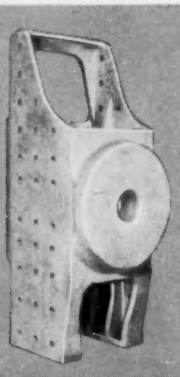
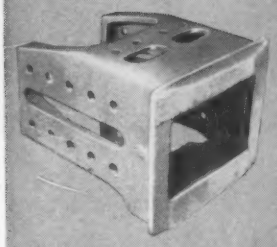
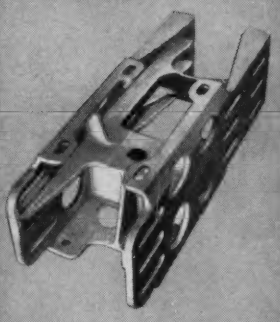


Hot Die Pressed Bolster Center Brace with integral cast Center Plate





A.A.R. Standard Striking Plate and Front Draft Lugs



A.A.R. Standard Bolster Center Brace and Rear Draft Lugs

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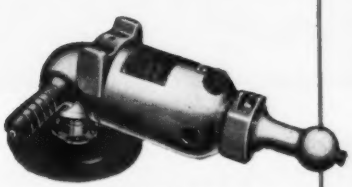

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Today's travelers are in a hurry. They want speed, and a smooth, relaxing ride. Shippers, too, demand faster service and minimum damage to lading. And everyone wants maximum safety.

That's why so many railroads are investing in roller bearing journal boxes—for diesels, for passenger cars, and for freight. *Roller bearings eliminate the hot box problem and permit the faster, safer, smoother service that attracts business!*

Important as it is, that's only half the story. Because when you invest in *Hyatt* Roller Bearing Journal Boxes, your savings multiply! Hyatt—and *only* Hyatt—offers the railroads *all* of these *extra* benefits:

1. **Controlled lateral**—Hyatt design allows freedom of axle movement, meaning a smoother ride and less wear on wheels and truck parts.
2. **Easiest installation**—Hyatt's amazingly simple assembly means important savings in man-hours whenever boxes are installed or reassembled.
3. **Press fits are not disturbed** when boxes are removed for inspection. A wheel is easily removed without disturbing the one-piece inner race.
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5. **Large-size straight radial rollers** provide greater load-carrying capacity and longer useful life.

Be sure you get the greatest value for your roller bearing dollars—*invest them in Hyatts!*

Car Department Officers

(Continued from page 64)

Lubricant selection is made difficult because mineral oils tend to deteriorate in the presence of air. The brass alloys as used in air brake work also act as catalysts and accelerate this deterioration, especially during periods of inactivity.

The ability of a lubricant to replenish or maintain itself between the contacting surfaces is an important factor in reducing wear and corrosion. Soft grease or one which permits some bleeding of the mineral oil will in many cases produce satisfactory results.

The choice of lubricants is limited by the need for proper operation over, in most cases, a temperature range of —40 deg F to 140 deg F. The oils and greases now recommended are compromises representing the best mixtures available for this range.

While the lubricants for most air brake devices are covered by AAR specifications, the reasoning behind these specifications may not be understood and consequently not fully appreciated. This paper describes the conditions influencing the adoption of different lubricants and tells what the minimum specifications must be for lubricating different parts and why.

Brake Cylinder Lubrication—To lubricate brake cylinders, the composition of the grease must be such that it will not cause swelling of the natural rubber packing cups which have been found to be superior to other types. The mineral oil used in the grease must be a compromise as a high viscosity oil reduces the swelling effect on the rubber cups while a low viscosity oil gives better lubrication at low temperatures.

With the present type of cast iron brake cylinders, the cylinder walls must be machined to a specially finished surface to retain the lubricant and to minimize packing cup wear.

AB Type Triple Valves have some parts with metal-to-metal contact and others with metal-to-plastic contact. At one time, two different lubricants were required—oil for the piston rings and dry graphite for the slide and graduating valves. However, when sufficient oil was supplied to the rings, some reached the slide valve and mixed with the graphite to form a gum that caused excessive friction.

It has been found that the proper oil will lubricate satisfactorily the slide and graduating valves as well as the piston rings. But only approved triple valve oil may be used. This oil must be of sufficient quality that it will not age between three-year cleaning periods. It must resist oxidation which the brass alloys used in slide valves tend to accelerate by acting as catalysts. The oil must further be free from impurities such as water, grit, and dissolved solids. While the effects of poor grade and dirty oils may not be immediately apparent, performance eventually will not be as expected.

New Lubricant On Trial—Under certain conditions moisture in the air brake

(Continued on page 116)

BRAND NEW ORE-HAULING OPERATION uses *Low-Cost Solid Bearings* for ALL CARS AND LOCOMOTIVES

U.S. Steel's Orinoco Mining Company standardizes on solid bearings with "Twinplex Alarm" and "Kool-End" features for all equipment in year-round non-interchange ore movement.

DOWN in Venezuela, a new ore-gathering system has just been completed by Orinoco Mining Company, covering 90 miles from ore fields in the Cerro Bolivar area to ore-conditioning plant and docks at Puerto Ordaz. Initial equipment orders called for 560 100-ton cars and 9 1600 h.p. B-L-H diesel-electrics — *all solid bearing equipped*. Orinoco expects to move 3,000,000 tons in 1954 — eventually plans operation of 125-car units. Short runs will permit rapid turnarounds, and cars will make upwards of 25,000 miles per year when operation is in full swing.

Orinoco chose solid bearings principally because of their low initial cost and the ease and economy with which they can be maintained. Dimensionally, the car journal bearings conform to standard AAR specifications for 6½" x 12" journals. They differ in that each is equipped with smoke and odor alarm cartridges for early detection of any overheated condition before it can become serious. The car bearings also have "Kool-Ends"—a thicker babbitt surface for both contact ends to reduce journal friction and provide cooler operating temperatures.

ATA Bearing Design for Locomotives.

Orinoco diesel-electrics use an ATA journal bearing design. These bearings are interchangeable with standard AAR bearings but different in that there's a deep side wall construction, providing greater journal-to-bearing contact area and preventing journals from rolling out from under the bearings. ATA bearings hug the journals — even during impacts such as occur whenever cars are "bunched" for any reason. Like the car bearings, these locomotive journal bearings also have "Twinplex" smoke and odor cartridges and "Kool-Ends."

Freight Car Bearing Performance

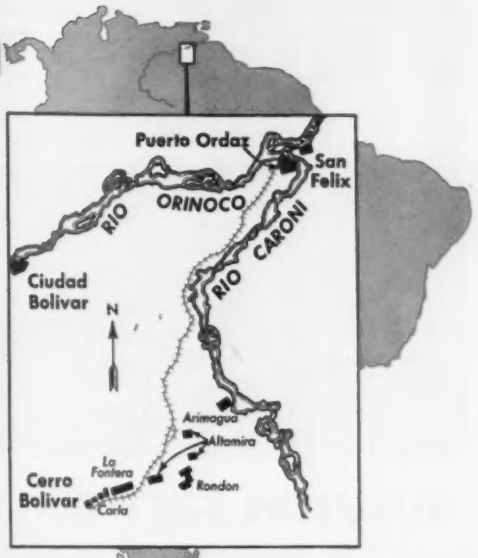
The figures at the right clearly indicate a trend to improved journal bearing performance, even with today's faster train speeds and heavier loads.

Higher standards of maintenance and inspection, combined with selective adoption of available developments, can continue to improve solid bearing performance — to the point where the incidence of hot boxes may be reduced to insignificance.

PERIOD	TOTAL CAR MILES	CAR MILES PER HOT BOX	% INCREASE OVER 1951
1951	34,726,490,070	172,703	—
1952	34,313,975,558	190,109	10%
1953	34,355,017,965	219,762	27%

now under way in Venezuela

One of 560 100-ton ore cars built for Orinoco by Magor Car Corporation. Planned movement is 150 round trips per year for average annual mileage of 25,000 miles per car.



Map showing route of ore cars from mine area to ore conditioning plant and port at junction of Orinoco and Caroni Rivers. Orinoco River was dredged to this point to permit operation of sea-going vessels. Total length of system is about 90 miles—with heavy movement down grade.

At left is car journal bearing like those applied to Orinoco cars. Size is 6½" x 12"—keeping maximum bearing loads well within recommended limits.

First of 9 B-L-H 1600 h.p. diesels with which Orinoco is beginning operations. Note six wheel trucks have standard boxes for solid bearings.

How Twinplex Alarm Bearings Work.

Twinplex Alarm Bearings provide a positive means of early detection of any overheated bearing condition. The smoke and odor cartridges are inserted in holes drilled longitudinally through the bearing back. Each cartridge is sealed with fusible metal that melts if temperatures of 350° F. are reached for any reason. When this happens, for a period of about 8 minutes one cartridge releases a heavy pungent odor (ethyl mercaptan) and the other a dense white smoke.

Ask us to give you complete details about Twinplex Alarm Bearings and other Magnus developments for improved freight car performance. Just write to Magnus Metal Corporation, 111 Broadway, New York 6; or 80 E. Jackson Blvd., Chicago 4.

MAGNUS

Solid Bearings

Right for Railroads

...in performance...in cost

MAGNUS METAL CORPORATION *Subsidiary of* **NATIONAL LEAD COMPANY**

Car Department Officers

(Continued from page 112)

system causes a washing action which eventually removes the triple valve oil from the piston. This allows corrosion to proceed at an accelerated rate and permits the formation of a lead oxide in the ring groove which may cause binding of the piston ring. Of the lubricants to resist this washing action that have been tested, the most promising is a compound of mineral oil with a small amount (less than 5 per cent) of lime soap added. Laboratory tests have shown good results with this compound in pistons where excessive water is present, and several roads are testing it in passenger equipment.

Rotary valves were originally lubricated with a soft graphite grease because of its resistance to being washed away by water, oil, or chemical solvents in contaminated air. However, it has been found that other greases not using graphite are satisfactory and that it is necessary only to use a suitable No. 1 lime base grease. The use of oil is not recommended as it usually does not have sufficient body to maintain proper lubrication.

The main problem with angle cocks and cut-out cocks is to use a grease in which the mineral oil does not bleed out during periods of inactivity and leave only the hard soap base. Best results are obtained with a special grease consisting of the usual combination of refined mineral oil and lime soap with the addition of a small amount of zinc oxide.

The lubrication of "O" Rings presents a condition similar to that of packing cups, a rubber to metal seal operating over a wide range of temperatures. The brake cylinder lubricant has proven satisfactory for both the AN (Army-Navy) and the commercial type "O" Rings. Regular angle cock grease of the type described previously is satisfactory with the "O" Rings used with some newer angle cocks.

Brake cylinder grease is recommended for all types of air cylinders where rubber packing cups are used. Cam surfaces, ratchets, ratchet wheels, pawls, and other like parts should be lubricated with a soft graphite grease with the same general characteristics as rotary valve greases.

In general, ball bearings should be lubricated with a soft grease that is practically free of moisture, neutral and contains no fillers except possibly graphite in colloidal form. Ball bearing lubrication for high-speed rotating devices such as wheel slip controllers and axle generators is more critical because of the higher speeds and loads involved. Unsealed bearings should be lubricated with a grease suitable for the low temperatures in which such devices may be expected to operate.

Lubricating rubber check valves with dry graphite prevents the rubber sticking to the valve seat after periods of inactivity or from moisture and oil in the air system. The graphite may be either natural or artificial but must not contain impurities such as grit or free iron which would cause abrasion of the valve and seat surfaces.

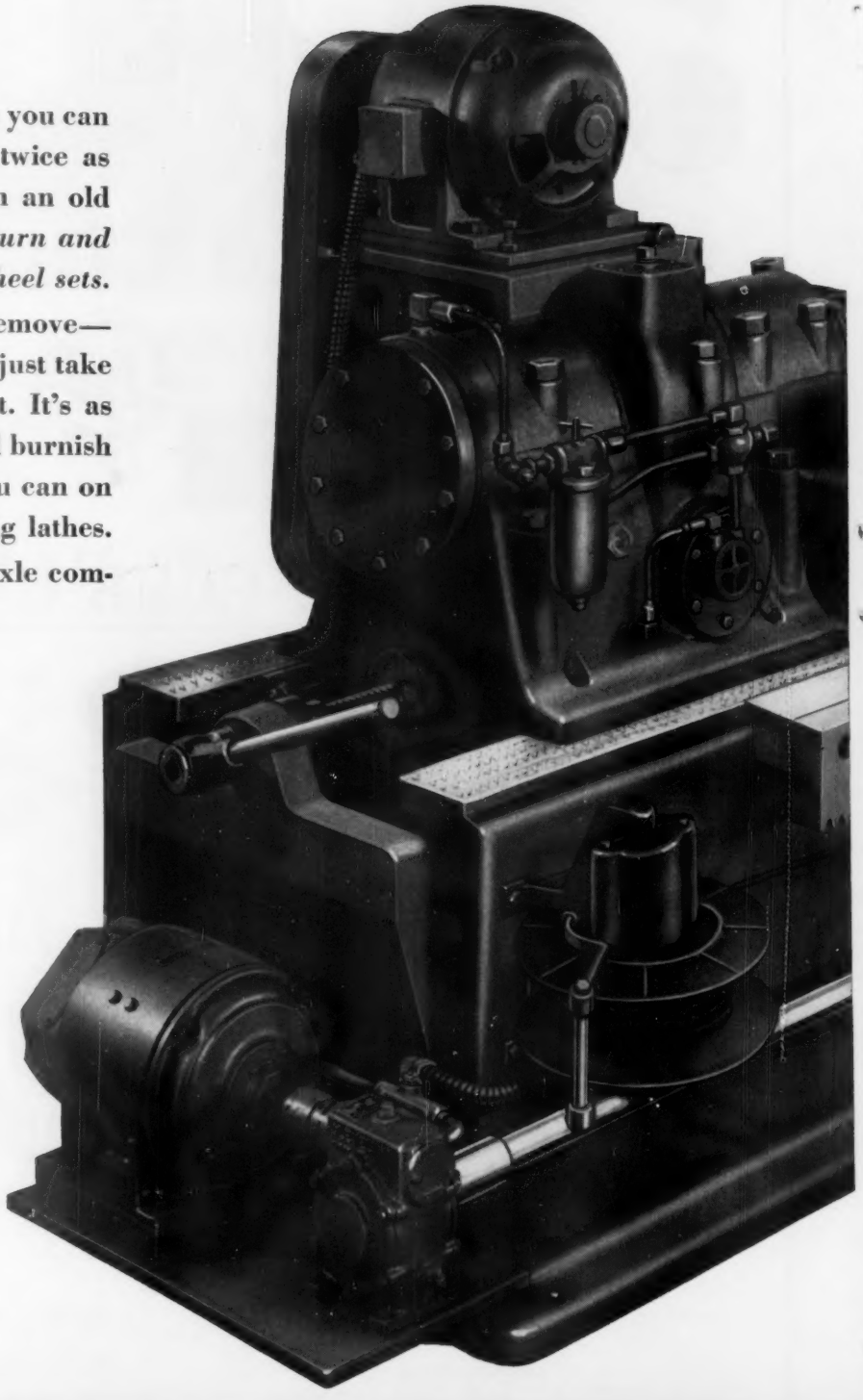
This report was submitted by the National Railroad Lubrication Committee.

Two for one plus

On the Sellers End Drive Axle Lathe you can not only turn and burnish up to twice as many axles per day as you can on an old style axle lathe, *but you can also turn and burnish the journals of mounted wheel sets.*

There are no filler blocks to remove—nothing to change on the machine—just take out an axle and put in a wheel set. It's as simple as that. And you can turn and burnish up to twice as many journals as you can on old style, center-drive journal truing lathes.

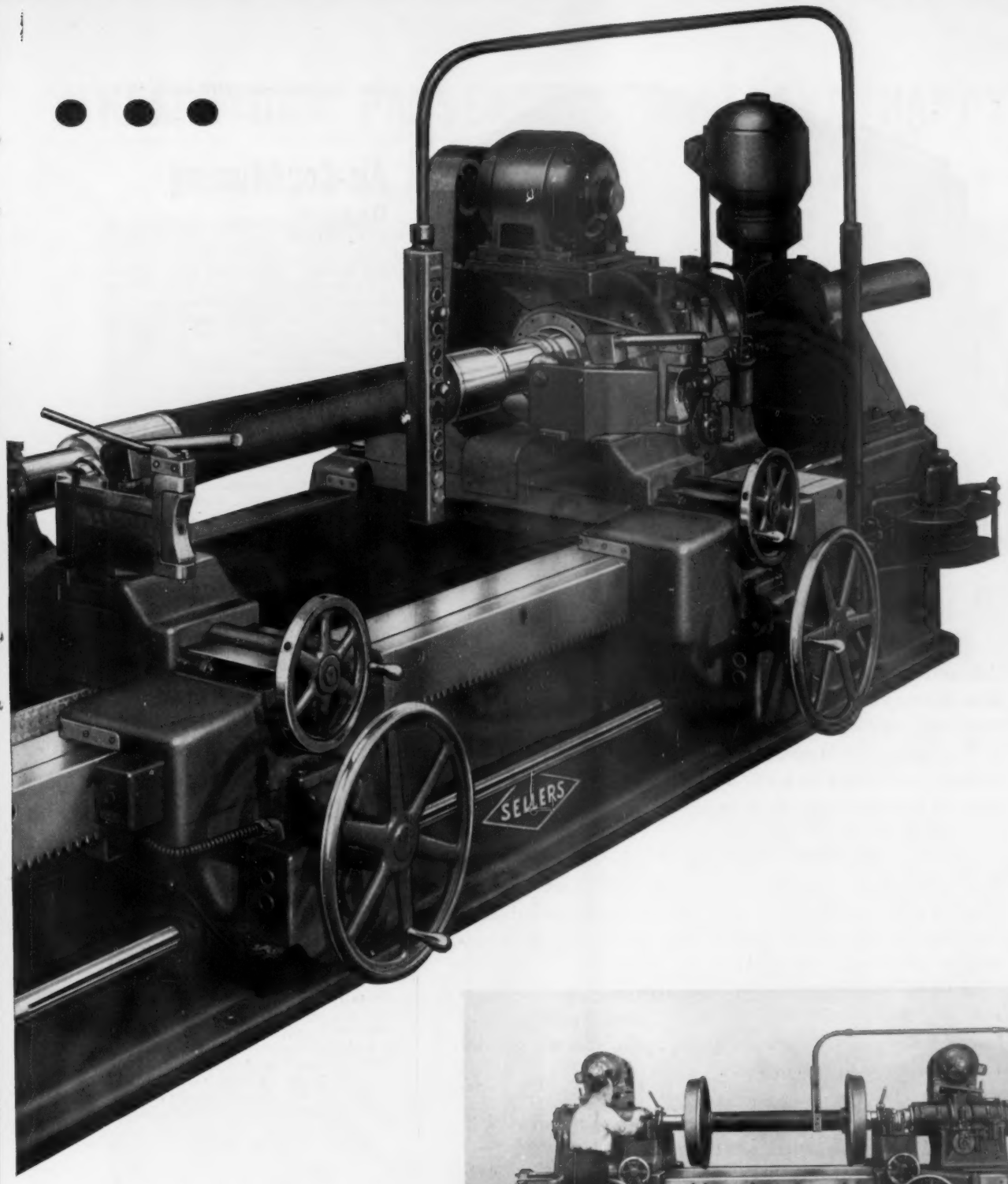
And if you want to machine an axle completely from end to end, you can do it on the Sellers End Drive Axle Lathe because there is no center drive to interfere.



Sellers End Drive Axle Lathe

CONSOLIDATED MACHINE TOOL

Wholly owned subsidiary of Farrel-



Truing Journals on
Sellers End Drive Axle Lathe

CORPORATION, ROCHESTER, N. Y.

Birmingham Company, Incorporated

Car Department Officers

(Continued from page 116)

Air-Conditioning Repairs

Any air-conditioning system to be successful must have proper passage of sufficient air over the evaporator and condenser. To accomplish this requires that the air filters, condensers and the evaporators be clean and maintained that way. The more dirt and dust removed from the air by the filters, the less dirt is available to restrict the passage of air through the evaporator during the cooling season and the overhead heat coil during the heating season.

Filter Maintenance—The air filters should be inspected daily or at the end of each trip so that an accurate check may be had of their condition. There is no fixed rule as to when a filter should be changed. Since conditions vary widely for different railroads, filters should be changed as required or in accordance with instructions established by individual railroads.

Air filters should also be checked for physical condition to see that the frame edges are not irregular that they are straight and that the seal betwen the filter frame and the holder into which they fit are in good condition. Unless the filter seal is good, dirt-laden air will bypass the filter instead of passing through the filter media. There are two types of filters, the throw-away and the cleanable. Most of the filters used on air-conditioned cars are of the type which can be cleaned. These can be cleaned either by hand or by use of a filter cleaning machine of which there are several on the market.

Evaporator Unit Maintenance—As the air from the car is forced over the evaporator (or steam heat coil in heating season) two things occur. The evaporator coils being colder than the air passing over them condenses some of the moisture in the air, thus reducing the humidity and cooling the air returned to the car body by transferring some of the heat in the air to refrigerant in evaporator coils.

To accomplish these functions, the evaporator coils must be clean. Any accumulation of dirt or corrosion on the evaporator coils acts more or less as an insulator and this in turn reduces the evaporator efficiency by reducing the amount of moisture removed from the air and retarding the transfer of heat to the refrigerant.

The first step in cleaning the evaporator is to blow out all loose dirt and dust from the evaporator, the air chamber about it and the air ducts to the car.

For each evaporator, a five-gallon mixture is made up by mixing 4 oz. of a penetrant cleaner to a gallon of water. This water is then heated to a temperature of about 180 deg. F. by means of a suitable spray gun; the mixture is sprayed first against one side and then against the other side of evaporator, being careful to blank off the opposite side of the evaporator from which the spray is being directed. The five-gallon mixture is divided between the two sides. The cleaning so-

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IMPROVED Exide-Ironclads now have power tubes made from *non-oxidizing* plastic for longest battery life. For full details, call your Exide sales engineer—write for Form 5010 (Installation and Maintenance of Car Lighting and Air Conditioning Batteries).

Your best power buy
. . . AT ANY PRICE!

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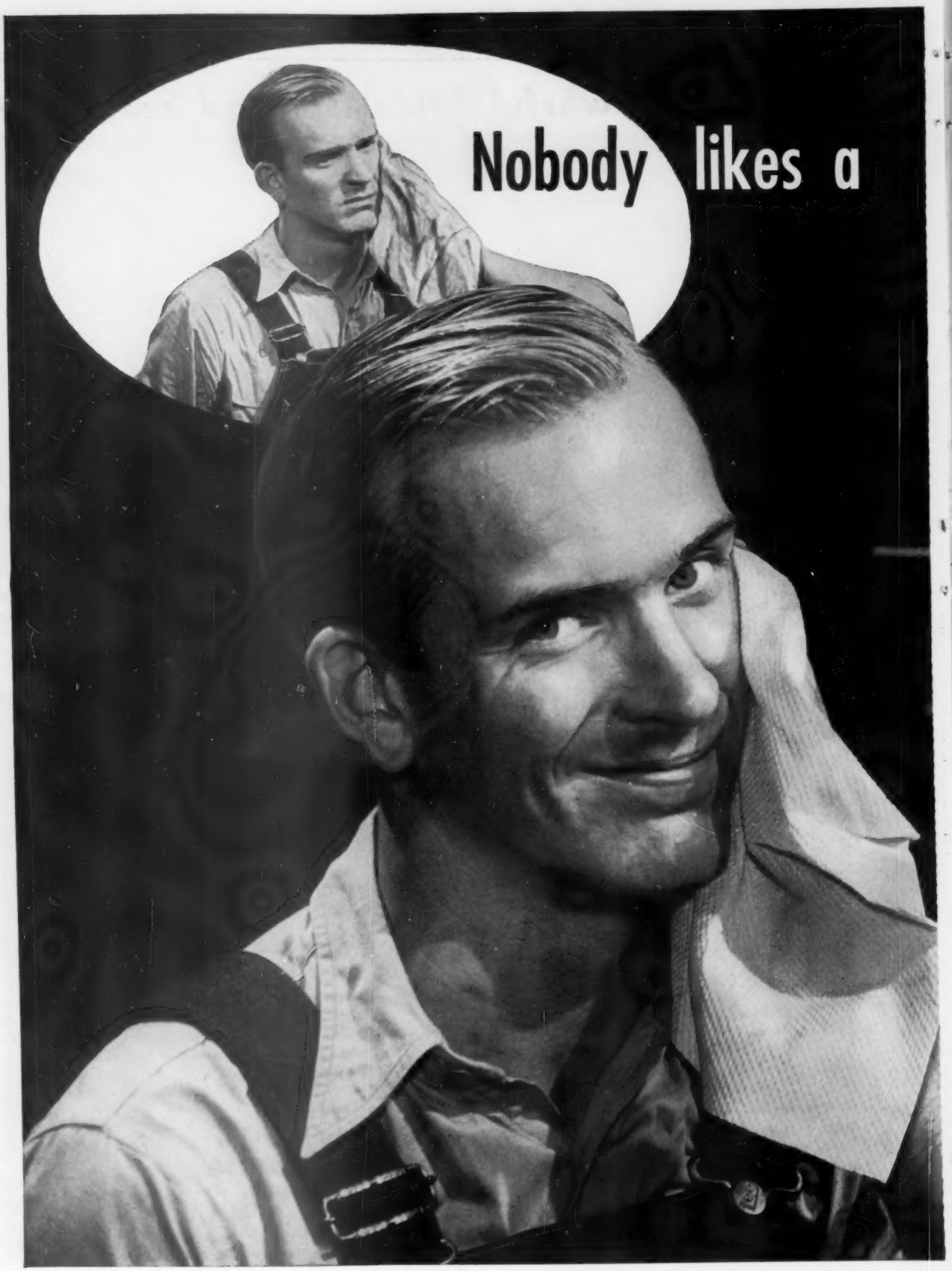
IRONCLAD® BATTERIES

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa.


Nobody likes a

Car Department Officers

(Continued from page 120)

lution is then followed with a rinse of clear water which is continued until the water no longer contains any visible dirt.

It is the recommendation of this committee that evaporators be cleaned in place in the car every 30 to 90 days or as required, and that whenever a car is shopped or given a general overhaul that the overhead evaporator unit be removed and thoroughly cleaned, this because the majority of units in service cannot be completely cleaned or inspected while in place.

When the evaporator is removed from the car the following cleaning methods are used; blow and wash off fins and tubing with high-pressure steam and water to remove excess dirt, scale and other foreign matter. After this the coil should be immersed in a hot tank of penetrant cleaner 4 oz. to the gallon, and allowed to soak for 45 min. The coil is then removed from the tank and again blown with steam and water. It must be remembered that if aluminum finned coils are used that proper penetrant be used.

The above points out the many difficulties in servicing the evaporator, and it is the recommendation of this committee that on all future new cars constructed a roof-hatch or at least larger access doors be provided consistent with car design.

Condenser Maintenance—The condenser, located outside the body of the car, is the medium by which the heat taken from the body of the car at the evaporator is transferred to outside atmosphere. The condenser is located under the car body and because of its closeness to the roadbed is subject to an immense amount of dust and dirt at all times. Because of this, it is essential that it be cleaned frequently. There are various types of condensers in use, the dry, spray and the full flooded.

Dry condensers are cleaned with either compressed air or water and the condenser box washed out at every lay-over terminal. This should be done monthly or oftener if needed. If a visual inspection indicates a more frequent cleaning, this can easily be done wherever air or water is available. Many condensers have a protection plate across the bottom. This in many cases is not readily removed so that the bottom coils may not be washed clean but lie in a layer of mud. This destroys the effectiveness of that part of the condenser. Where no special arrangements are made to wash the dirt from the bottom it is necessary to remove the plate, dig out the dirt and replace the plate. This is a laborious job and requires a great amount of extra work.

The maintenance of the spray-type condenser is essentially the same as the dry with the exception of the problem of proper cleaning of the spray nozzle.

The maintenance of the full-flooded type condenser consists of checking the spray header, pump and pump motor, water-feed valve and flushing the sump at each lay-over terminal. At shopping the coils should be checked and, if required, cleaned in the same manner as the evaporator coil.

The report was prepared by a committee under the direction of Chairman C. Manzelman, air conditioning and electrical foreman, CMStP&P.

"7,125 men and women signed up to join those already saving for their financial security..."

GEORGE H. COPPERS

President,
National Biscuit Company

"There is no greater honor than partnership in an enterprise as important to a nation as the Payroll Savings Plan for United States Savings Bonds. We view our recent person-to-person canvass of employees in behalf of Bonds as practical patriotism. It supports our Government's efforts to stabilize the value of the dollar. The campaign also benefited our employees. 7,125 men and women signed up to join those already saving for their financial security in this easy, automatic way."

The Payroll Savings Plan is the backbone of Series E Bond Sales. 8,500,000 employees in more than 45,000 companies invest more than $160,000,000 in Savings Bonds *every* month.

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Your phone call, telegram or letter to Savings Bond Division, U.S. Treasury Department, Washington 25, D.C., will bring prompt co-operation from your State Savings Bond Director. Act today.

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Railway Locomotives and Cars

Air Brake Assn.

(Continued from page 81)

should be located in the cab for easy reference, especially on units having No. 6BL, No. 6SL or any of the equipments with a distributing valve, which should be located below the cab floor. The spring value of the "DE" fixture should not require changing the safety valve setting each time the unit is towed or returned to operation. When a unit is towed with the diesel engine running, the compressor governor bypass valve should be set to unload the compressor.

The builders should locate the main reservoir safety valves and the non-return check valve between the No. 1 and 2 reservoirs in the engine room or car body to prevent freezing of the moisture in the lines.

The main reservoir safety valves should be adjusted to open not less than three pounds below the standard pressure as specified by the rules to prevent the surge of pressure exceeding the standard pressure when the valve opens. Safety valves on air equipment should be adjusted to a range of not less than three pounds between opening and seating to prevent pounding.

Piping and Hose—The committee renewed a previous recommendation to elimtnate the flexible hose connections (line hose) in the brake pipe, electro-pneumatic straight air pipe and signal line. This flexible hose connection has generally been located in an inverted U position just ahead of the end valve, near the car bolster. Attention was called to the need for installing all short lengths of regular pipe or copper tubing with some flexibility.

The committee found that regardless of recommendations in previous papers, no progress has been made on end connection hose. It therefore recommended that the Air Brake Association either appoint a committee or empower the present committee to meet with locomotive builders to decide and agree on a minimum number of standard sizes for hoses.

Brake Equipment Recommendations—The A2 emergency relay valve should be made a fundamental part of the No. 6 brake when used on locomotives other than switch engines under 1,000 hp and not equipped for multiple unit operation. This is in addition to the brake pipe vent valve.

On units having diesel controls in the cab, a three-way valve should be installed instead of a double-throw check valve in the actuating pipe before the pipe enters the rotair valve from either of the independent brake valves. This is a safety measure to prevent the brakes on the locomotive releasing should some one depress the handle of the independent brake valve on the control equipment during a brake application.

Units developing 2,000 hp or more should have an air compressing capacity not less than 200 cfm at idle speed to eliminate the necessity of increasing the engine and compressor speed to supply the compressed air demand at times.

This report was prepared by a committee, of which A. M. Malmgren, general diesel and air brake supervisor of the Frisco, is chairman.

Master Boiler Makers

(Continued from page 70)

vision of a competent chemist, with the knowledge of what acid and strength is required to remove the scale formation in the particular boiler being cleaned.

Tying Up Boilers — There are two methods commonly used, the "dry" and the "wet" method. As the terms imply, one involves keeping the boiler full of water, while the other involves keeping it dry. The choice of method depends to a large extent on how long the boiler is to be kept out of service, and on whether or not it may be needed for quick emergency service.

The Dry Method—This method has advantages over the other when a boiler is to be kept out of use for a long period of time and will not be needed for emergency purposes. However, the method necessitates getting and keeping the interior of the boiler absolutely free from moisture. Unless an adequate degree of dryness is maintained, the boiler may sustain damage. A means of attaining this is

IN DIESEL-ELECTRIC LOCOMOTIVE SERVICE

DEVELOPMENT of diesel-electric locomotive brushes — themselves relatively new in application — has drawn heavily on many previous years' experience with brush applications in other fields.

NATIONAL CARBON has consistently paced carbon-brush development in this country. Our original research in the mechanics and chemistry of brush composition — in commutating ability, cable-fraying, wear, friction and mechanical strength, to name a few — has established many of the existing standards of quality for the industry.

This big "difference" in experience is reflected in performance — helps explain the fact that more "National" brushes are used in diesel-electric locomotive service than all other makes combined!

How good is really good brush performance?...
Use "National" brushes and see!

The term "National", the Three Pyramids Device and the Silver Colored Cable Strand are registered trade-marks of Union Carbide and Carbon Corporation

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Master Boiler Makers

(Continued from page 126)

to use a small fire of light wood in the furnace. At no time should the boiler surfaces be allowed to become hot or uncomfortable to the touch of the hand.

After the boiler has been thoroughly cleaned and dried internally, trays of some moisture-absorbing materials such as quicklime should be placed inside the shell of a fire tube boiler and in all drums of a water tube boiler. The manholes, handholes and all connections on the boiler should be tightly blanked or closed after the lime has been placed in the boiler. If it is to be kept idle for a considerable period of time, it should be opened every three or four months for examination and renewal of the lime if necessary.

The amount of lime necessary in this method is about 20 lb per 100 hp boiler capacity or 7 lb per 1,000 lb per hr boiler capacity. Calcium chloride is sometimes substituted for quicklime, but is not recommended since it would become corrosive when in contact with boiler metal surfaces.

The Wet Method:—Under the wet method, the boiler is held full of water. The best time to start laying up is when the boiler is taken off the line and shut down. At least 30 min before the boiler comes off the line, add the following chemicals: (1) Catalyzed sulfate sufficient to give 500 ppm in the boiler water (approximately 5 lb per 1,000 gal holding capacity). (2) A selected properly processed tannin or lignin material sufficient to give a dark boiler water color (approximately 1 lb. per 1,000 gal holding capacity of boiler). (3) Caustic soda sufficient to give a hydrate alkalinity of 100 gpg in terms of $CaCO_3$ in the boiler water (approximately 10 lb per 1,000 gal holding capacity of boiler). The wet method should be used if boilers must be left idle for a period longer than a week with water in them, so as to constitute emergency service if required. The boiler should be thoroughly cleaned and carefully inspected to insure all is in good order.

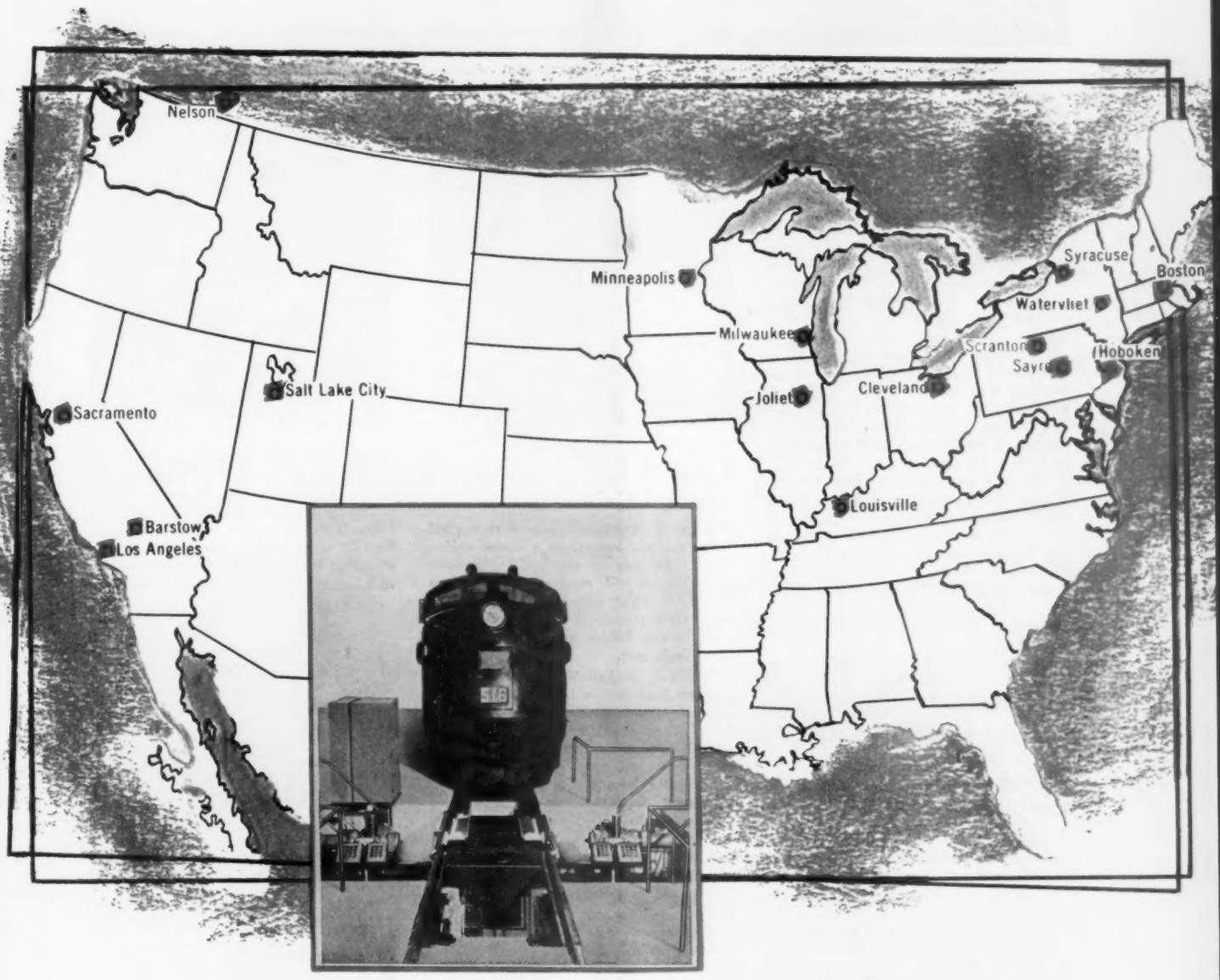
After the boiler is filled to the normal water level, the water should be boiled with the boiler properly vented to atmosphere for a short period. This procedure is necessary to expel the dissolved gases released from the water by boiling. The water should then be made alkaline in excess of 400 ppm by the use of caustic soda.

In addition, sufficient sodium sulfite should be added to the boiler water to produce a minimum residual sulfite content. After the boiler is cooled somewhat, but before a vacuum is created, the boiler should be filled completely and all connections closed. Periodically, at approximately weekly intervals, tests of the water should be made and the alkalinity and sulfite concentrations increased if necessary to maintain recommended concentrations. Feed valves and all steam connections should be kept tight at all times.

If necessary for such an idle boiler to be returned to service, the boiler should be drained and refilled before placing on

MORE and MORE RAILROADS

making MORE and MORE Savings!



The list of railroads taking advantage of the profit possibilities in *Standard's Wheel Truing Machine* is growing rapidly.

Standard *RAILWAY EQUIPMENT MANUFACTURING COMPANY*
GENERAL OFFICE: 4527 Columbia Avenue, Hammond, Indiana
New York • Chicago • St. Paul • San Francisco

Standard *Railway Equipment Manufacturing Co., (Canada) Ltd.*
Sun Life Building, Montreal

line to reduce boiler water alkalinity and prevent carryover.

Another method of laying up boilers of both water and fire tube types is to thoroughly clean internally all loose scale and sludge and rattle tubes if necessary. Then, make certain that all water feed and steam lines are shut off tight or disconnected so that there will be no leaking into boiler. All manholes and handholes are left off allowing air to circulate through boiler. This method is satisfactory but the wet method is superior for a short period of time.

Externally, all accumulation of soot or slag should be cleaned off of boiler, brickwork, grates, ashpits, stoker or burner equipment. Repairs made to all equipment and boilers left with doors open so that equipment and brickwork will be kept dry and ready for service.

This data was abstracted from a report "Study and Recommended Practices for the Washing and Maintenance of Stationary Boilers to Increase Washout Periods and Recommended Methods for Tying up Boilers". C. R. Kirkwood, Supervisor of Boilers, New York Central System, Chairman.

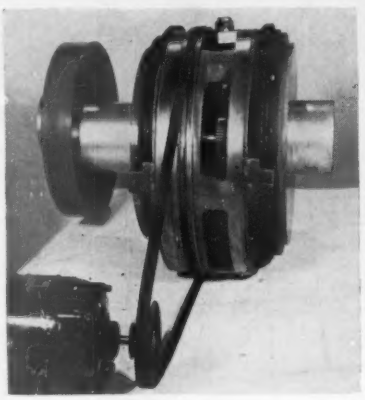
NEW DEVICES

(Continued from page 6)

Non-Acid Rust Remover

A non-acid rust remover, that simultaneously strips paint, rust and primer from ferrous metal surfaces, is an alkaline solution which requires only two steps, a dip and a pressure rinse. There is no need for after-neutralizing or pre-cleaning.

According to the manufacturer, the formulation removes the heaviest rust, red-oxide primer, baked lacquer, acid-proof paint and asphalt finishes. An alkaline material, it contains no cyanide compounds and requires no electrolytic action. It is used as received, without dilution and will not cause corrosive fumes. *Turco Products, Inc., 6135 South Central Avenue, Los Angeles 1.*



Crank Pin Journal Grinder

This grinder has been designed to regrind any crank pin journal on a diesel engine crank shaft used on standard locomotives, power house and marine diesel engines within the crank case without having to remove the crank shaft. The device is built in two halves and bolted together as a single unit.

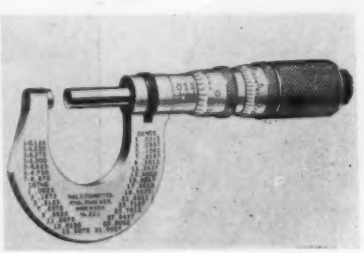
One half section is equipped with a grinding head with a ball bearing spindle and two grinding wheels used to grind the pin from shoulder to shoulder or end to end. It is equipped with a down feed to feed the grinding wheels and adjust the grinding head for different crank pin diameters. A gear-driven automatic reversing feed to move the head and wheels over the crank pin journal is also provided. A diamond grinding wheel trueing adjustment is furnished to keep the grinding wheels in position and proper condition.

The opposite half section is equipped with a gear reducing unit to revolve the device at a proper speed around the crank pin journal. Both halve sections, when bolted, are driven by a single V-belt from a 1½ hp motor located on either side of the crank case. The machine revolves on adapters located at each end of the crank pin journal.

A self-centering device is used to center and mount the adapters and is also made in half sections. It is equipped with three centering posts to hold the device central with a crank pin journal.

The grinder is capable of grinding journals from 6 to 8-½ in. diameter, 6 in. long. It weighs approximately 150 lb. The centering device weighs 50 lb and weight of adapters depend on shape an size.

Metco, Inc., Kalamazoo, Mich.



Direct Reading Micrometer

This micrometer caliper reads direct in ten-thousandths of an inch without the use of a Vernier scale. It is said to make every measurement with exactly the right spindle pressure without relying on "feel".

The device features the Hi-Precision thimble consisting of an inner thimble reading in thousandths and an outer

The Engineer's Report

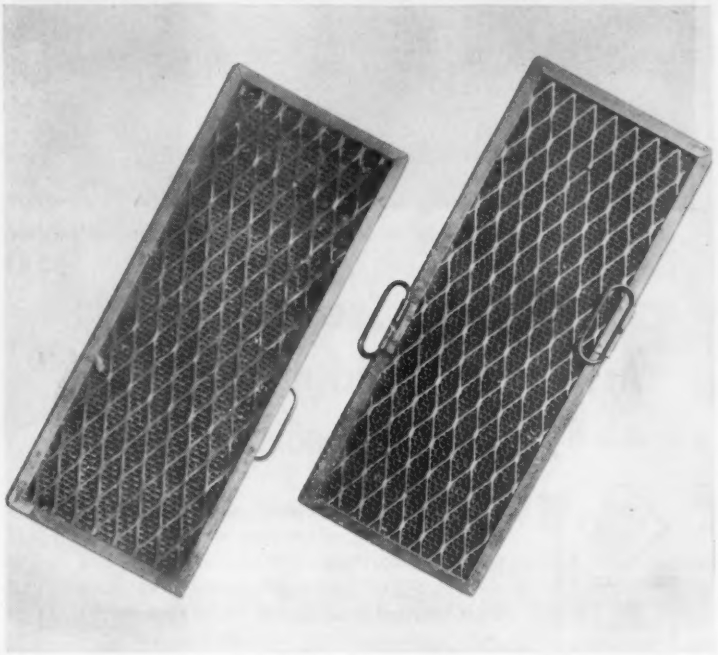
CASE HISTORY

PRODUCT *Calol Filter Coat*

FIRM *Bamberger Railroad Co., Salt Lake City, Utah*

Adhesive filter coating keeps dirt out of engines!

CALOL FILTER COAT prevents dirt from coming through air filters on the Bamberger Railroad Co.'s locomotives, even though heavy, salt-laden dust blows almost constantly along a portion of their Ogden to Salt Lake City right-of-way. Car-body filter at right shows dirt collected in only 30 days on this run. Interior side of same filter, far right, is clean, showing that dirt was trapped in the filter. With ordinary oil coatings, dirt got into engines and caused extra wear—engines had to be overhauled every year. "Since using Calol Filter Coat, none of our engines has been overhauled in a year and a half," says J. F. Buckley, Master Mechanic. "Inspections show much less wear on cylinders. Engine compartments stay so clean now that dust entering any tiny crack shows as a definite streak on the floor." No drip pans are used with Calol Filter Coat because it always stays in place. It increases the efficiency of all their impingement-type air filters.



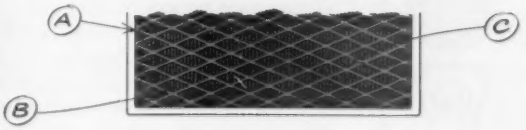
FREE CATALOG: "How to Save Money on Equipment Operation" will be sent on request to Standard Oil Company of California, 225 Bush St., San Francisco.

FOR MORE INFORMATION about this or other petroleum products of any kind, or the name of your distributor, write or call any of the companies listed below.

CALOL

TRADEMARK "CALOL" REG. U. S. PAT. OFF.

How Calol Filter Coat Ups Efficiency of all Impingement-type Air Filters



A. Will not drip off or flow from screens—full amount applied remains over the entire service period with sustained high filtering efficiency at all ambient temperatures. Easily applied by conventional methods.

B. Has high wicking ability—quickly soaks through dirt particles in all air velocities and extreme dust concentrations.

C. No loss from contact with rain or snow, filters are easily cleaned with usual hot-water-detergent solutions.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Perth Amboy, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado

thimble with widely spaced graduations which gives direct readings in ten-thousandths. Accuracy throughout its 0 to 1 in. range is within 0.00005 in.

Other features include satin chrome finish, hardened and ground spindle, decimal equivalents on frame, etc. Units are also available with carbide spindles and anvil faces. *L. S. Starrett Company, Athol, Mass.*

Rubber Waste Retainer

A rubber waste container and retainer for freight-car journals has been designed to eliminate the major cause of overheated journals. The device has the approval for unlimited use in interchange by the AAR and is marketed under the trade name Plypak.

The device is said to overcome displacement of conventionally packed journal-box waste packing by holding this waste in place against the journal to maintain uniform flow of lubrication. Comb-like projections molded into the retainer fit against the journal and prevent waste from climbing and catching under the bearing. Circulation of oil is supplemented by a pumping action of the resilient device which is alternately squeezed and released by vertical action of the car.

Plypaks are molded from a compound containing B. F. Goodrich Chemical Company's Hycar by Davidson Rubber Company, Boston. They are available from *Waugh Equipment Company, 420 Lexington avenue, New York 170.*

Dual Purpose Fire Fighting Aid

This Proportioner, attaches to a 2-½ in. discharge gate of a pumper and quickly produces Airfoam for extinguishing gasoline, oil, or grease fires, etc. It is designed to draft 6 per cent Airfoam solution, or by means of an adapter, will draft a 3 per cent solution.

A water metering device is a separate part of the unit, and has two positions,

(Continued on page 135)

Speed Air Brake Maintenance

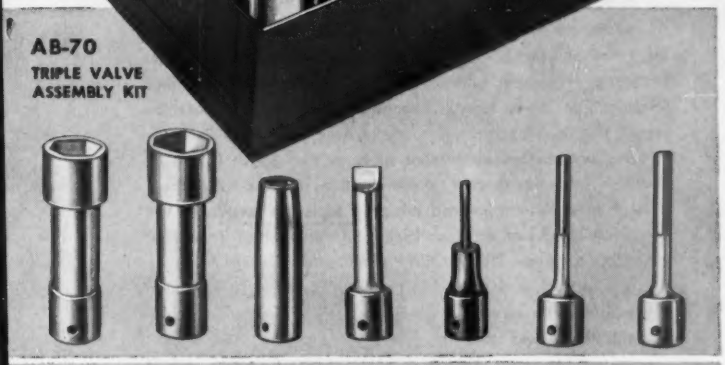
with STANDARD AND SPECIAL

Snap-on* Tools for ALL AIR BRAKE WORK...

in shop or yard

● ALL the standard and special tools needed for fast, efficient air brake work on Diesels—steam locomotives—passenger coaches—freight cars—*Snap-on has them for you!* For yard and repair track use, the MR-2 Brake Set illustrated above. For test stand work, the AB-70 Triple Valve Assembly Kit. For Diesel air brake maintenance, the DLAB-35 set (for work on the 24-RL pedestal and air brake accessory equipment). Snap-on also offers special tools for passenger car air brake work, car yard inspector's wrenches, etc.

MR-2 and DLAB-35 sets include wrench sizes which fit nuts on present brake equipment, and new American standard nut sizes that may be used on new equipment. Write Snap-on's Railroad Division for catalog sheets listing air brake and other special railroad maintenance tools.

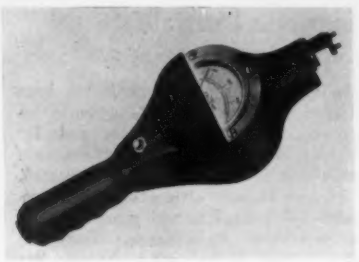


SNAP-ON TOOLS CORPORATION
Railroad Division
8130-J 28th Avenue • Kenosha, Wisconsin

*Snap-on is the trademark of Snap-on Tools Corporation

one for drafting a water solution for extinguishing ordinary combustible type fires, and one for drafting Airfoam liquid for the flammable liquid fires. It can be switched from one position to the other in seconds.

The unit is capable of producing up to 600 gal of Airfoam per min, frees one fireman for other duties as the pumper operator handles liquid containers. It has a wide operating pressure range on the inlet side from 200 to 300 psi. *American-La France-Foamite Corporation, Elmira, N.Y.*



Illuminated Dial Hand Pyrometer

A new illuminated dial feature, which is incorporated as an extra in the line of Xactemp hand pyrometers, permits reading the instrument in poorly lighted areas without flashlights or auxilary lighted.

Two easily replaced batteries are contained in the handle of the device. A push-button switch lights the bulb under the shield. *Claud S. Gordon Company, 3000 South Wallace street, Chicago 16.*

Portable Power Hack Saw

This hack saw has been developed to cut thin-sectioned material such as rolled forms, structural shapes, tubing, pipe, conduit or cable as well as spacers, bushings, bar stock, heavy tubing and angle iron. Being portable, it can be carried to wherever the job is; in the tool room, stock room, welding shop, sheet metal department or laboratory.

Weighing 48 lb, the device, named the Hand-I-Hack, cuts in any position items such as metal, plastic or fiber stock of 3 in. or less diameter at any angle from 45 to 90 deg. Its blade draw cuts and then lifts on its return stroke, eliminating the necessity of weights. The unit is self-supporting and can make repeated cuts within a tolerance of 0.01 in. *Lipe-Rollway Company, Syracuse, N. Y.*

Manufacturers' Literature

Following is a compilation of free literature, pamphlets and data sheets offered by manufacturers to the railroad industry. Circle the number(s) on the coupon below to receive the information desired; the requests will be sent direct by the manufacturers.

1. OIL PURIFICATION. *Centrico Inc.* 16-page booklet (205) "Centrifuges for Oil Processing" gives performance data on Westfalia's three oil separator models for purifying fuel and lube oils.

2. ENGINE TEMPERATURE CONTROLS. *Minneapolis-Honeywell Regulator Co.* 28-page booklet "Engine Temperature Control Systems for Diesel Locomotives" gives basic data on engine cooling and detailed discussion of service and installation of systems for all major types of diesel locomotives.

3. LATHES. *Rivett Lathe & Grinder Inc.* 12-page 2-color catalog (918-SLB) "Machining For Profit" illustrates and describes the Rivett 918 "Steelway" Precision Cabinet Lathe, includes description of two new types of drive.

4. AUTOMATION. *Reliance Electric and Engineering Co.* 12-page illustrated booklet (A-1555) "The Tools of Automation" expresses the company's philosophy of combining applied engineering, creative thinking, and electric motor drives to provide the "know-how" for automation of single machines or continuous processes.

5. HOT EXTRUSIONS. *Allegheny Ludlum Steel Corp.* 4-page folder (SS41) describes and illustrates the new hot extruded shapes it is offering in stainless, tool steels, high temperature alloys, and other steels.

6. MAGNETIC SHEET SEPARATORS. *Homer Manufacturing Co., Inc.* Catalog page (form SS-210) fully describes, illustrates and gives dimensions on the line of Homer Magnetic Steel Sheet Separators.

7. U. S. MOTORS. *U. S. Electrical Motors, Inc.* New multi-colored booklet "Life-Lengthened Power" illustrates in natural color and describes the 20 principal types of U. S. motors, including Uniclosed, Totally-Enclosed, Explosion-Proof with and without fan, Varidrive, and Syncrogear.

8. HOT BOXES. *American Brake Shoe Co., National Bearing Div.* 24-page profusely illustrated booklet (H-103) "Facilities For Finding Facts" is a word and picture report on what the American Brake Shoe journal bearing research laboratory is doing to solve the hot box problem.

9. CUTTING & WELDING PRODUCTS. *Air Reduction Sales Co.* 52-page General Products Catalog (ADC-662B) "This Is Where To Find The Best Cutting and Welding Products" describes and illustrates the Airco products.

10. MULTI-V BELT DRIVES. *B. F. Goodrich Co.* 76-page "B. F. Goodrich Multi-V Belts Engineering Handbook" (4-8155-G1) features convenient guide to design of standard and high capacity drives, gives horsepower rating tables, gives 22 easy-to-read tables, includes topics on multi-V drive selection, installation and care of V belt drives.

11. GEARING. *Foote Bros. Gear and Machine Corp.* 8-page bulletin (DRB) "Get More For Your Gear Dollar" gives a quick picture of the product design improvement opportunities offered gear users of Duti-Rated Lifetime Gearing; typical ratings are charted.

12. ATTACHMENTS & ACCESSORIES. *South Bend Lathe Works.* 40-page catalog (5418) "South Bend Attachments. Accessories" illustrates and offers full specifications on the South Bend complete line of machine tool attachments and accessories.

13. HARD FACING CHART. *Mir-O-Col Alloy Co., Inc.* New comprehensive chart on hard-facing rods and electrodes lists those produced by 29 different manufacturers, provides a quick, easy review of any one particular type hard-facing rod or electrode at a glance.

14. HYDRAULIC TRACER. *Axelson Manufacturing Co.* Bulletin completely describes the new Axelson *Trace-O-Matic* Hydraulic Tracer attachment which converts Axelson's general purpose lathes into contouring production machines.

15. UNIT HEATER. *American Air Filter Co.* Catalog-bulletin (700-A5) gives full capacity and specification data on the new series of high CFM low outlet temperature Herman Nelson horizontal unit heaters.

16. TEMPILSTIK. *Tempil Corp.* Sheet 5010ST. "Instructions For Using Tempilstiks" shows some factors which affect temperature indication by Tempilstiks, gives suggestions on temperature determination, and includes few sample 300°F Tempil Pellets.

17. LIQUIDS HANDLING. *George D. Ellis & Sons, Inc.* 4-page 2-color folder (Bulletin 63) describes, illustrates and gives specifications for the complete line of Ellisco liquids handling equipment.

Reader Service Department — OCTOBER, 1954
Railway Locomotives and Cars
30 Church Street, New York 7, N. Y.

Please send literature circled below:

1 2 3 4 5 6 7 8 9
10 11 12 13 14 15 16 17

Also, please send me additional product information as follows: (company, product & page number) .....

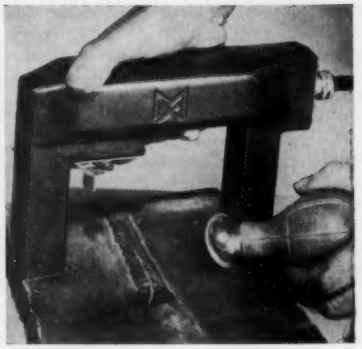
.....

Name ..... Title or Position .....

Company .....

Address .....

City ..... Zone ..... State .....

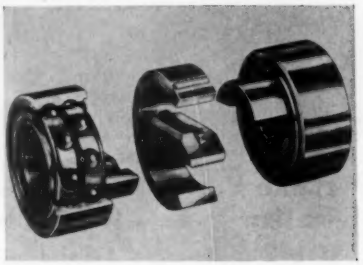


Magnetic Particle Inspection

This light weight portable unit has been designed for preventive maintenance inspection, for weld inspection and for limited volume inspection of any magnetic part where surface cracks are suspected.

The manufacturer claims that the device, named Y-5 Yoke Kit, will prove valuable for preventive maintenance. Travelling cranes, crane hooks, press frames, lift fork trucks and many structural items can be quickly inspected.

One man performs all inspection operations. He handles the unit with one hand, both power control and positioning, and with the other he dusts on the Magnaflux powder. The area covered by each application of the yoke varies up to approximately 24 sq in. It can be used in restricted areas and its 100 ft of cord permits flexible operation. The unit weighs 7 lb. *Magnaflux Corporation, 7300 West Lawrence Avenue, Chicago 31.*



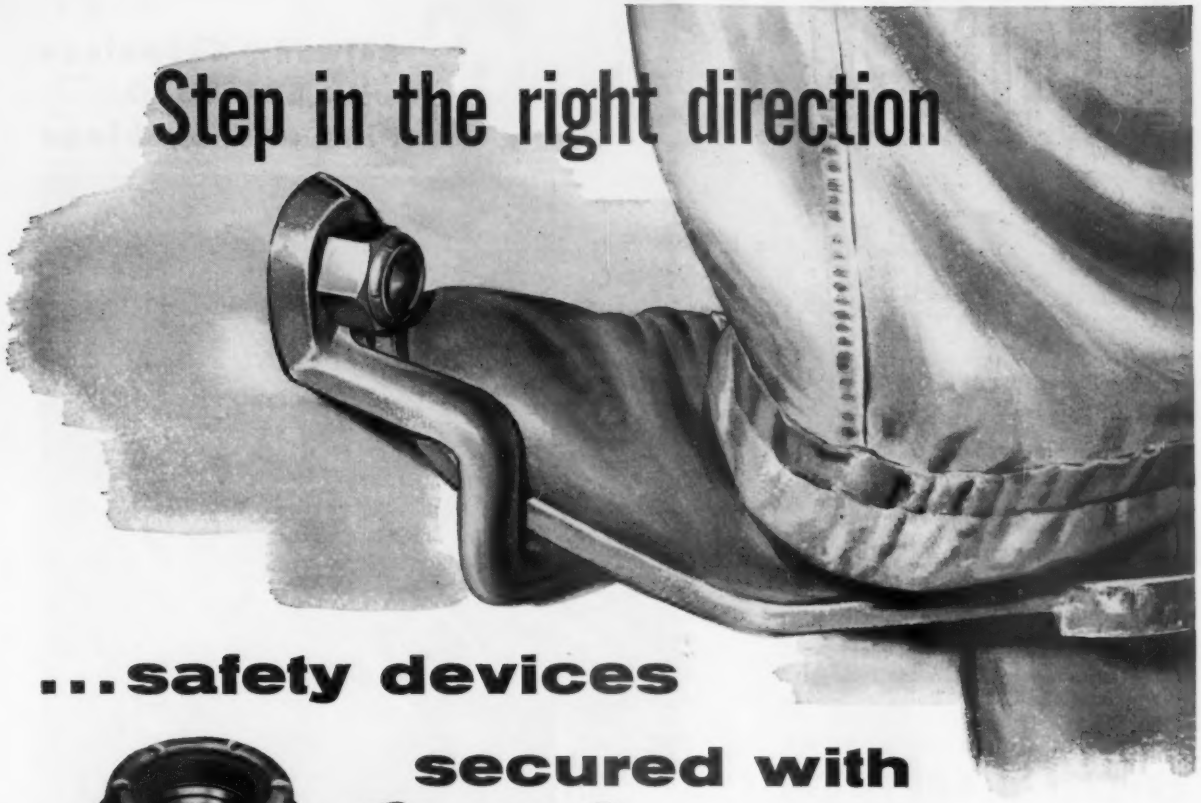
Torque Transmitter

A device called Nobak, transmits torque both in clockwise and counterclockwise rotation, while positively preventing reverse torque action. The unit can also be used to lock a driven mechanism in any angular position.

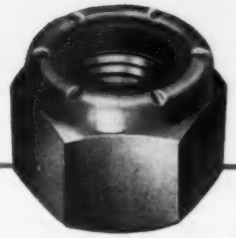
This product is available to manufacturers for machinery and industrial equipment. It can be used in all types of vehicles, hoists, cranes, actuator mechanisms, etc. *Ahlberg Bearing Company, 3025 West 47th Street, Chicago 32.*

(Continued on page 139)

Step in the right direction



...safety devices



secured with *Elastic Stop*® nuts

safety appliances and others such as:

coupler carriers
draw gears
pedestal tie bars
brake rigging
spring equalizer seats
truck mounted equipment
center plate bolts
miscellaneous equipment on under frame

Today, major Diesel builders are using Elastic Stop nuts for a variety of critical applications.* No other fastener provides so much positive protection against the pounding vibration that is a part of modern high speed freight and passenger operation.

Elastic Stop nuts offer production and maintenance advantages, too. The same elastic collar that damps out vibration makes the nuts self-locking—a one-piece assembly—and reusable many times.

Many roads are replacing double nuts or castellated nuts with Elastic Stop nuts wherever safety of personnel and maintenance costs are factors. ESNA can serve you better on these and all other critical applications.

Elastic Stop Nut Corporation of America
also maker of the ROLLPIN

ROLLPIN TRADEMARK

Mail Coupon

for further information on ESNA® self-locking fasteners for locomotives, freight and passenger cars.

Dept. N61-1023, Elastic Stop Nut Corporation of America
Railway Sales Division
2330 Vauxhall Road, Union, N. J.
Please send me the following free information:

☐ Elastic Stop nut bulletin
☐ Rollpin bulletin
☐ Here is our problem. What fastener do you suggest?

Name_____ Title_____

Firm_____

Street_____

City_____ Zone____ State_____

C. B. Peck

(Continued from page 5)

that CB could have qualified for a professorship in an engineering college. Had he chosen that course, he would have shaped, at the most, the thinking of one or two *hundred* students a year. Fortunately, he chose instead to impress the findings of an analytical mind on the many *thousands* of railroad men who read and have read the columns of the "Age" and the "Mechanical."

His work in the American Society of Mechanical Engineers, of which he is a Fellow, a past officer and, over the years, chairman of several committees, has enabled him not only to carry on his "teaching" but, through his work in student guidance, to advise and encourage the prospective engineer.

The other day an experienced industrial advertising manager asked this reporter to put in the record that "C. B. has, over the years, established a standard for editorial integrity, independence and excellence that stands as a 'measuring stick' of business journalism quality in these days when expedience is looked upon as a virtue rather than as what it really is." H. C. W.

H. C. Wilcox

(Continued from page 5)

business, he returned to the Lackawanna first as a designer, then as general supervisor of stationary boiler inspection; ICC valuation pilot, and as an assistant in the mechanical engineer's office.

In 1924 the then *Railway Mechanical Engineer* advertised for a new associate editor; Managing Editor Peck hired his ultimate successor for the job. Only 11 months after joining the paper, the new man was charged with opening up a new editorial office at Cleveland, to serve a "middle zone" between New York and Chicago where the growing machine tool industry, expanding steel production, and the emergence of the Van Sweringen system of railroads, among other things, dictated on-the-ground editorial coverage. In 1933, Wilcox came back to New York as associate editor of both RME and its affiliated weekly, *Railway Age*, and as editor, shop section, of the Locomotive and Car Builders' Cyclopedias. He brought back a reputation as a keen student of the machine-tool market in railroading, which won him a leave-of-abscence stint on the staff of the federal coordinator to report on this field.

A visit to Harold's home out in the Jersey "wilderness," shows that "being interested" extends to many things. There you will find a collection of guns, souped-up hi-fi for presenting a big record collection; a cluttered darkroom that gets heavy workouts both for color and black and white. There are predawn fishing trips "off the back porch" when the trout are willing and the competition is still abed.

There isn't any place the new editor won't go to track down new ideas and no rumor of an idea which doesn't give him itchy feet. As to how he will run this paper, those around the shop have no fears.

W. H. S.

—ADVERTISERS IN THIS ISSUE—

Reports from 22 railroads indicate...

AIR-MAZE oil bath air filters for diesels save their cost in one year!

TWENTY-TWO RAILROADS have switched to new Air-Maze oil bath filters on the air intakes of hundreds of diesels for freight, passenger and switching service. And reports indicate that savings from the new Air-Maze filters will equal their cost in only one year!

What makes these savings possible? Air-Maze oil bath air filters reduce diesel engine wear, servicing costs, turbo-charger maintenance.

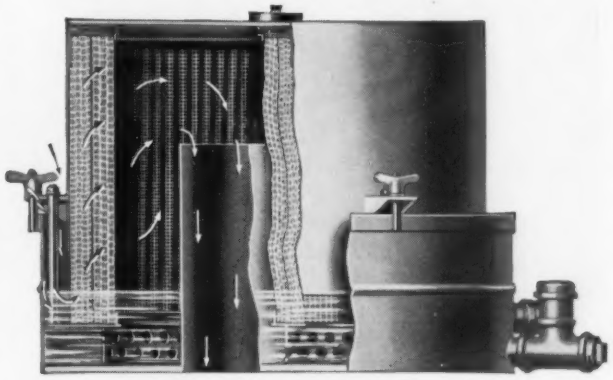
Oil bath filters cut engine overhaul costs because they scrub intake air clean in a bath of oil. An oil-washed screen filter traps any remaining dust, passing only clean, oil-free air. Abrasive dust and dirt can't get through to wear out rings, ring grooves, and liners.

Oil bath filters reduce servicing costs, too. In areas where airborne dirt concentrations are heavy, ordinary filters must be cleaned as often as twice a week. By contrast, Air-Maze oil bath filters go at least three months without changing oil!

And because there's less dirt build-up on the turbo vanes, these filters also reduce turbo-charger maintenance. Turbo wheels stay in balance, bearings last longer.

Air-Maze oil bath filters are now available for the locomotives listed below. For further information on how they can help you cut your diesel locomotive filtering costs, call on us or see your locomotive builder.

AIR-MAZE OIL BATH FILTER MODELS AVAILABLE FOR THESE LOCOMOTIVES



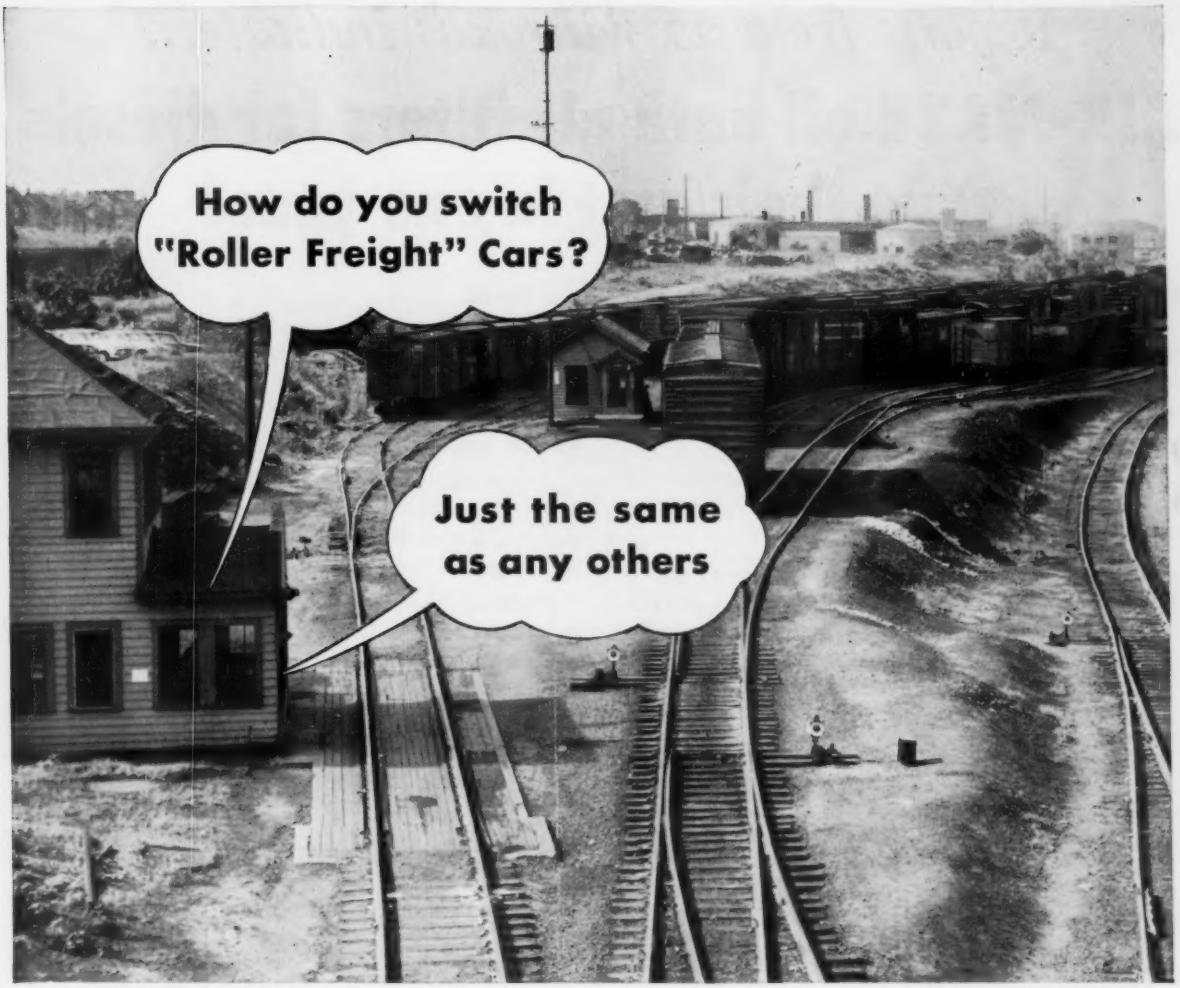
FREE BOOKLET: For complete information on these new developments in railroad diesel engineering, write for your free copy of the booklet, "Air-Maze Air Filters Specially Engineered For Railroads." The Air-Maze Corporation, 25000 Miles Avenue, Cleveland 28, Ohio. In Canada, Masdom Corp., Montreal and Toronto; Fleck Bros., Vancouver.

LOCOMOTIVE MFG.	HP	SERVICE
Electromotive	600	Switcher
Electromotive	1000	Switcher
Electromotive	1200	Switcher
Electromotive	2000	Rd. Pass.
Electromotive	2250	Rd. Pass.
Electromotive	1350	Rd. Freight
Electromotive	1500	Rd. Freight
Electromotive	1500	Rd. Switch.
Electromotive	800	Switcher
Alco-GE	800	Switcher
Alco-GE	1000	Switcher
Alco-GE	1500-1600	Rd. Switch.
Alco-GE	1500-1600	Rd. Freight
Alco-GE	2250	Rd. Switch.
Alco-GE	2250	Rd. Pass.
GE-Cooper Bessemer	600	Switcher
B-L-H	800	Switcher
B-L-H	1000	Switcher
B-L-H	1200	Switcher
B-L-H	1500-1600	Rd. Switch.
B-L-H	1500-1600	Rd. Freight
F-M	1000	Switcher
F-M	1200	Switcher
F-M	1600	Rd. Switch.
F-M	2000	Rd. Switch.
F-M	2400	Trainmaster

The biggest names in diesels are protected by Air-Maze filters

AIR-MAZE The Filter Engineers

AIR FILTERS • SILENCERS • SPARK ARRESTERS • LIQUID FILTERS • OIL SEPARATORS • GREASE FILTERS



NO change in switching practice is required for "Roller Freight", either in flat yards or hump yards. No special riders or car retarders are needed. That's the experience of roads now using cars with Timken® tapered roller bearings.

Because "Roller Freight" cars roll uniformly, they are easier to handle than friction bearing cars. But switching practice is the same.

Of course in *train operation* there is a tremendous *difference* between "Roller Freight" and cars with friction bearings. Timken bearings eliminate the hot box problem because they eliminate sliding friction. They ROLL the load.

In terminals, Timken bearings cut bearing inspection time 90% because you inspect them just by feeling the box cover. And you very seldom need to add lubricant. Moreover Timken bearings have less starting friction which means fewer starting jolts, less chance of damage to lading.

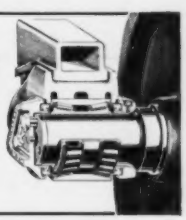
To shippers "Roller Freight" means faster, more dependable service. That's why it can be the railroads' big talking point in the battle for tomorrow's freight business.

Four roads now have "Roller Freight" fleets of 1000 cars or more and many other roads have smaller numbers. When all the railroads go to "Roller Freight" they'll save an estimated $190 million per year and will net a 22% return on the investment. These statistics are from "Economics of Freight Car Roller Bearings". Write for a free copy. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⬭ AND THRUST →⬭← LOADS OR ANY COMBINATION →⬭←